Original Instructions

User's Manual

Sentry® Z9000

Natural Gas Odorization System

SPD Z9000.2.2 Rev 1 05/14

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 9001:2008

SENTRY® EQUIPMENT CORP

966 Blue Ribbon Circle North • Oconomowoc, WI 53066 USA
Tel 262.567.7256 • Fax 262.567.4523

www.sentry-equip.com

Do not install, maintain, or operate this equipment without reading, understanding and following the proper Sentry Equipment Corp instructions. Otherwise, injury or damage or both may result.

Copyright

© 2010 Sentry Equipment Corp. All rights reserved.

Information contained in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording for any purpose without the express written permission of the manufacturer. The Z9000 is protected under US patent # 7,056,360 and others pending.

When calling for service, please be prepared to provide the configuration number of your equipment:

A	B	C	D	E	F	G	H
Z9 -	0	1	1	L	M	C -	24V

A Family
Z9 = Z9000

B Enclosure Type
0 = Single enclosure with integrated mechanics and electronics

C Metering Valve
1 = MV1
2 = MV2

D Servomotor
0 = Brushless
1=Brushed

E Modem
X = None
L = Land Line
W = Wireless

F Controller
M = ControlWave Micro

G Flow Meter
C = Optical Comparator

H Voltage
5V = 5 Volts
24V = 24 Volts

Table of Contents

Safety Information. iv
General Safety Precautions v
Warning Labels. vi
1. Overview 1
1.1 Principles of Operation: 1
1.2 Drip Mode 2
1.3 Batch Mode 2
2. Unit Configuration 3
2.1 Connecting to the Z9000 3
2.1.1 Connect remotely via modem 3
2.1.2 Connect locally via laptop computer 7
2.2 Configure Using TechView 9
2.2.1 Valve Settings 10
2.2.2 Gas Settings 11
2.2.3 Odorant Settings 12
2.2.4 Batch Settings 13
2.3 Configure Using Local Display 14
2.3.1 Settings Menu 14
2.3.2 Odorant Settings 15
2.3.3 Gas Settings 16
2.3.4 Valve Settings 18
2.3.5 Batch Settings 19
3. Common Operations 20
3.1 Calibrate Optical Comparator 20
3.2 Calibrate Servo 21
3.2.1 TechView 21
3.2.2 Local Display 22
3.3 Change Injection Rate 23
3.3.1 TechView 23
3.3.2 Local Display 23
3.4 Change Manual Flow Rate 24
3.4.1 TechView 24
3.4.2 Local Display 24
3.5 Clear Alarms 25
3.5.1 TechView 25
3.5.2 Local Display 25

3.6 Fill the Tank 26
3.6.1 Local Display only 26
3.7 Save/Load Recipe File 27
3.7.1 Save Recipe File (TechView only) 27
3.7.2 Load Recipe File (TechView only) 27
3.8 View Odorant Level 28
3.8.1 TechView 28
3.8.2 Local Display 28
4. TechView Software 29
4.1 Starting the Software 29
4.2 General Navigation 29
4.2.1 Context-Sensitive Help 30
4.3 Z9000: Data 31
4.3.1 Z9000 Overview Screen 33
4.3.2 Z9000 Odorant Used Screen 35
4.3.3 Z9000 Alarms Screen 37
4.4 Z9000: Settings 39
4.4.1 Power Settings Screen 41
4.4.2 Servo Settings Screen 41
4.4.3 Valve Settings Screen 43
4.4.4 Gas Settings Screen 45
4.4.5 Odorant Settings Screen 47
4.4.6 Batch Settings Screen 49
4.4.7 Drip Mode Settings Screen 49
4.5 Z9000: Logs 50
4.5.1 Z9000 Archives Screen 50
4.5.2 Z9000 Data Collection Screen 51
4.5.3 Z9000 Audit Trail Screen 51
4.6 Recipes and Ports: Recipes 53
4.6.1 Z9000 Recipes 53
4.7 Recipes and Ports: Ports 54
4.7.1 Z9000 Port Status Screen 54
4.8 Recipes and Ports: Date Time 55
4.8.1 Date and Time Settings Screen 55
4.9 On Line Edits 56
4.10 Parts and Prints: Drawings 56
4.11 Parts and Prints: Parts 57
4.12 Parts and Prints: Notes 57

5. Local Display Firmware 58
5.1 Navigating the Local Display 59
5.2 Changing Settings 59
5.3 Home Screens 60
5.4 Settings 61
5.4.1 Drip Settings 62
5.4.2 Power Settings 63
5.4.3 Odorant Menu 64
5.4.4 Odorant Settings 65
5.4.5 Odorant Usage 66
5.4.6 Gas Settings 67
5.4.7 Valve Settings 68
5.4.8 Batch Settings 69
5.4.9 Servo Settings 69
5.4.10 System Settings 70
5.5 Alarm 72
6. Troubleshooting 74
7. Standard Warranty 77
8. Factory Assistance 79
Appendix A: Modbus Map 80

Safety Information

Please read the entire manual before attempting to unpack, set up or operate this product. Pay careful attention to all *Warnings*, *Cautions*, and *Notes*. Failure to do so could result in serious personal injury and/or equipment damage.

Use of Hazard Information

If multiple hazards exist, the signal word corresponding to the greatest hazard shall be used.

Definitions

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to personal injury, but that could result in property damage.

NOTE: Information that requires special emphasis.

SHALL: This word is understood to be mandatory.

SHOULD: This word is understood to be advisory.

General Safety Precautions

Selection, Installation, and Use

Improper selection, installation, or use can cause personal injury or property damage. It is solely the responsibility of the user, through its own analysis and testing, to select products suitable for their specific application requirements, ensure they are properly maintained, and limit their use to their intended purpose.

Follow proper local, state and federal regulations for proper installation and operational requirements.

Always use caution and common sense when working with any chemical. Read the product label and MSDS carefully and follow the instructions exactly.

Potential Equipment Hazards

Hot surfaces! This equipment may have very hot surfaces. If an operator contacts a hot surface, injury may occur. Use protective clothing to prevent injury. If other equipment comes in contact with a hot surface, damage to the equipment may occur. Ensure the area around this equipment is kept clear to prevent damage from occurring.

High pressures! This equipment may contain fluids at very high pressures. Prior to installing, removing or maintaining this equipment, ensure that the equipment is isolated from all connecting piping, the equipment is depressurized, the contents have been drained, and the equipment is cool.

Warning Labels

Location	Content
Power Strip	Before connecting power 1. 6A Fuse 2. Wire Sized for 24VDC@6A 3. Isolated from Pipeline 4. Proper power protection 5. Conduit per C1D2 Standards
Maple Display	WARNING -Explosion Hazard- Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.
Servo	Important Note: Do not over-tighten these mounting bolts Please tighten these mounting bolts at a “snug” fit. (You will feel some play in the Servo housing as this is normal)
Servo	Per *Class 1 Div 2* standards and Zeck Systems manufacturer warranty, please remove power source prior to connection
Storage Tank	*(This tank has been pressure tested at the factory)* Important procedure to follow before filling tank with odorant: Evacuate air and pressure test prior to filling tank with odorant.

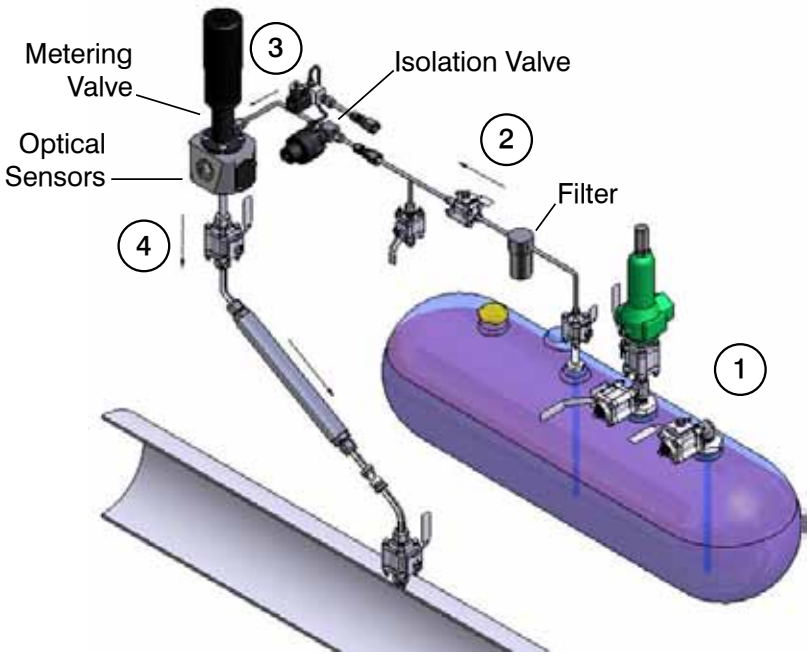
1. Overview

The Z9000 Natural Gas Odorization System is a feature-rich, complete odorization package that avoids the operational and functional complexities associated with other odorizers or the odorization process. Every action is intuitive and predictable. The Z9000 is a proven system, working reliably in some of the most sensitive areas imaginable, including major cities that experience blizzard conditions year after year. Because of the communication features, remote locations are also accommodated. With only two moving parts exposed to odorant, virtually everything can be taken care of remotely.

1.1 Principles of Operation:

The Z9000 automatically calculates and dispenses measured doses of odorant into natural gas pipelines proportional to the gas flow rate.

1. An odorant storage vessel is pressurized to about 15 psi above pipeline pressure. An upstream regulator or nitrogen source is commonly used.
2. Odorant moves from the vessel probe through the filter to the isolation valve.
3. When the controller opens the isolation valve, odorant flows to the metering valve.
4. As the controller opens the metering valve, drops fall past the optical sensors into the gas stream.
5. As they fall past the optical sensors, information is communicated to the controller.



6. The system controller interfaces with the metering valve servo, optical system, gas flow information, local interface, remote interface, etc., to maintain a constant odorant injection proportional to the gas flow rate.

1.2 Drip Mode

Drip mode provides a continual dripping of odorant into the stream at appropriate proportions. Drip mode is typically used for gas flow rates higher than 10 mscfh. However, this can vary based on conditions and customer desires.

1.3 Batch Mode

Batch mode periodically provides a batch of drips, then shuts until a sufficient volume of gas has flowed to justify another batch to achieve desired injection rates. Batch mode is typically used for gas flow rates lower than 10 mscfh. However, this can vary based on conditions and customer desires.

2. Unit Configuration

There are two (2) different options available for configuring the Sentry® Z9000: configuration using TechView or configuration using the local display. Regardless of which option is used, there are certain settings which should be defined before putting the Z9000 into service:

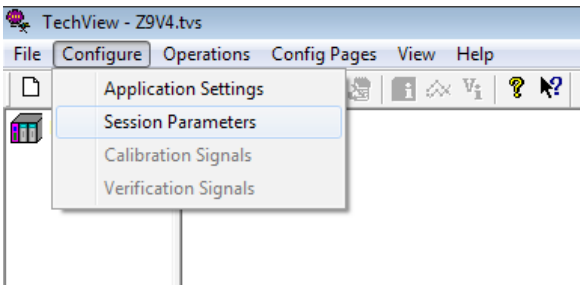
- Valve Settings
- Gas Settings
- Odorant Settings
- Batch Settings

2.1 Connecting to the Z9000

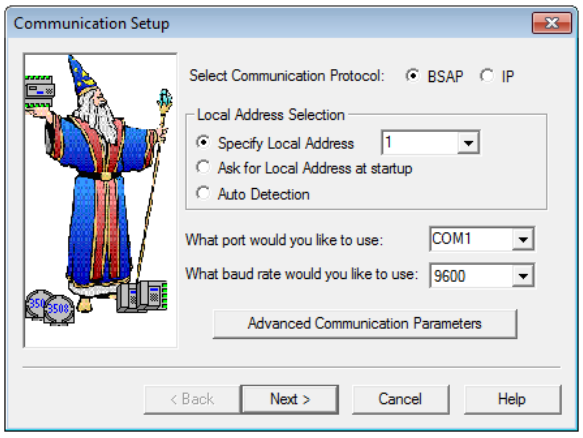
2.1.1 Connect remotely via modem

This option requires a modem to be installed in the Z9000 unit. See the Z9000 Installation & Operation Manual for instructions on how to set up the modem.

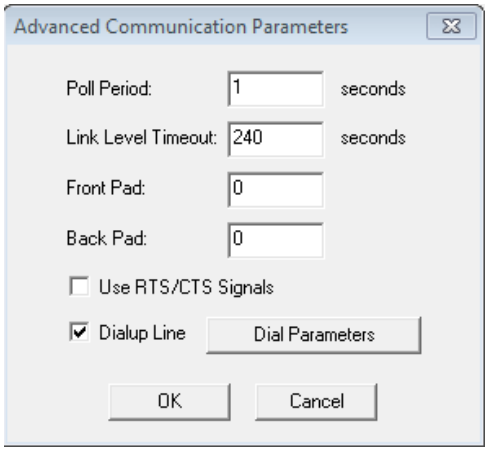
1. Make sure that the latest versions of Open BSI and TechView are installed on your computer. If you do not have these, please contact Sentry Equipment Corp for assistance.
2. Open the TechView file, C:\ZeckSystems3\TechView\Z9V4.tvs.
3. Click **Cancel** on the login screen that appears.
4. From the Configure menu, select Session Parameters to open the Communication Setup dialog box.



5. In the Communication Setup dialog:
   - select BSAP as the communication protocol
   - specify the comm port the modem is using to dial out
   - make sure the baud rate is 9600.



6. Click **Advanced Communication Parameters** to configure the telephone dial-up parameters.



The value of each setting depends upon the telephone line and modem used. Setup is a matter of trial and error, but once you find a combination that works, it should work for any unit that you call.

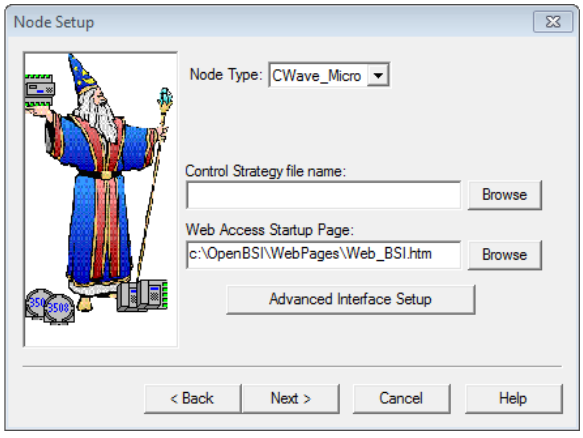
a. Poll Period: Defaults to 1; this number usually works.

b. Link Level Timeout: Defaults to 0; other numbers to try are 5, 10, 60, and 240. This number changes based on your telephone line.

c. Front Pad/Back Pad: Try both as 0 or both as 4.

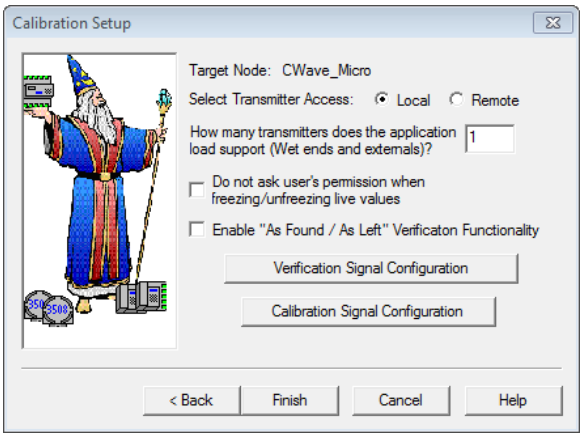
7. Check the box for Dialup Line, then click **Dial Parameters**.

8. Enter the telephone number of the unit in the *Enter modem commands and phone number to be dialed* field.
   - If using a dedicated line, enter DT (dial tone), a space, and then the telephone number.
   - If calling long distance, include the area code.
   - If the telephone system requires you to dial 9 (or some other number) to obtain an outside line, enter this number as the first digit of the telephone number.
9. When your desired settings have been entered, click **OK** to apply them.
10. When you are done entering parameters, click **OK** to get back to the Communication Setup screen, then click **Next** to advance to Node Setup.
11. In Node Setup, check the address of the Web Access Startup Page: C:\OpenBSI\WebPages\Web_SBI.htm.



Click **Next** to advance to Calibration Setup.

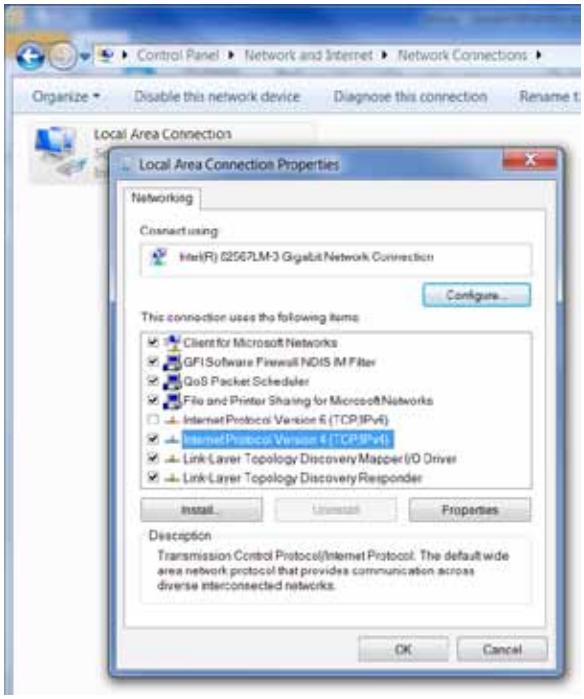
12. In Calibration Setup:
    - Transmitter Access should be Local.
    - Number of transmitters should be 1.



13. Click **Finish** to complete the setup and open the SignOn to RTU dialog box .
14. In the SignOn to RTU dialog box, enter the default user name (MVZ) and password (122654), and then click **SignOn** to connect with the unit.
    - If the unit does not connect properly, adjust the communication parameters (see step 6) until you find values that work, or call Sentry Equipment Corp for assistance.
15. Once you have successfully connected to the unit and are ready to sign out, select the File menu on the main TechView screen and choose *Save Session As*.
16. In the Save Copy As window, name the file with the site name and serial number, then click Save. The next time you need to call this unit, the file can be found in C:\ZeckSystems3\TechView\.
17. Continue with section 2.2 Configure Using TechView.

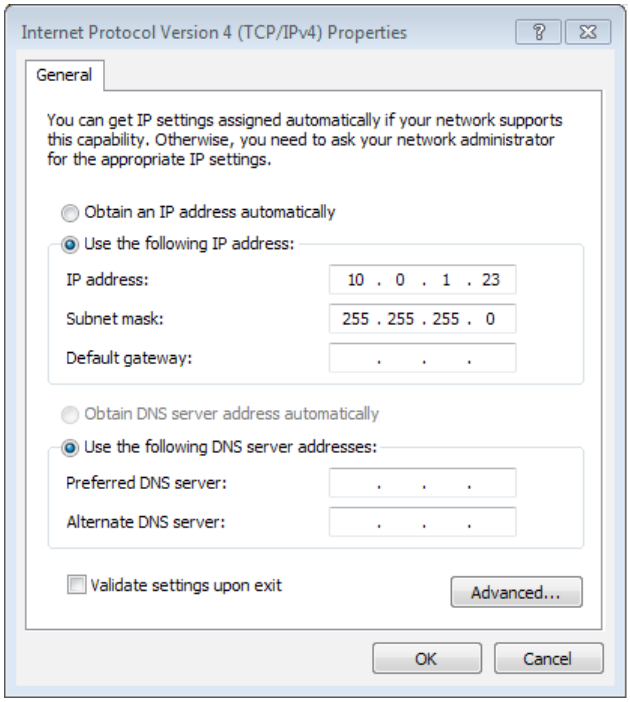
2.1.2 Connect locally via laptop computer

1. Make sure that the latest versions of OpenBSI and TechView are installed on your computer. If you do not have these, please contact Sentry Equipment Corp for assistance.
2. Configure the IP address on your computer to talk to the odorizer. Do this by changing the properties of your Local Area Connection.
   a. In Windows, click on the Start menu and select Control Panel > Network and Sharing Center > Change adapter settings.
   b. Right click on Local Area Connection and select Properties from the drop-down menu.


Control Panel ▸ Network and Internet ▸ Network Connections ▸
Organize
Disable this network device
Diagnose this connection
Local Area Connection
Local Area Connection Properties
Networking
Connect using:
Intel(R) 82567LM-3 Gigabit Network Connection
Configure...
This connection uses the following items:
Client for Microsoft Networks
GFI Software Firewall NDIS IM Filter
QoS Packet Scheduler
File and Printer Sharing for Microsoft Networks
Internet Protocol Version 6 (TCP/IPv6)
Internet Protocol Version 4 (TCP/IPv4)
Link-Layer Topology Discovery Mapper I/O Driver
Link-Layer Topology Discovery Responder
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
OK
Cancel

   c. In the Local Area Connection Properties box, select Internet Protocol Version 4 (TCP/IPv4), then click the Properties button.

d. In the Internet Protocol Version 4 (TCP/IPv4) Properties box, choose the option to Use the following IP address, then enter:
   - IP address: 10.0.1.23
   - Subnet mask: 255.255.255.0

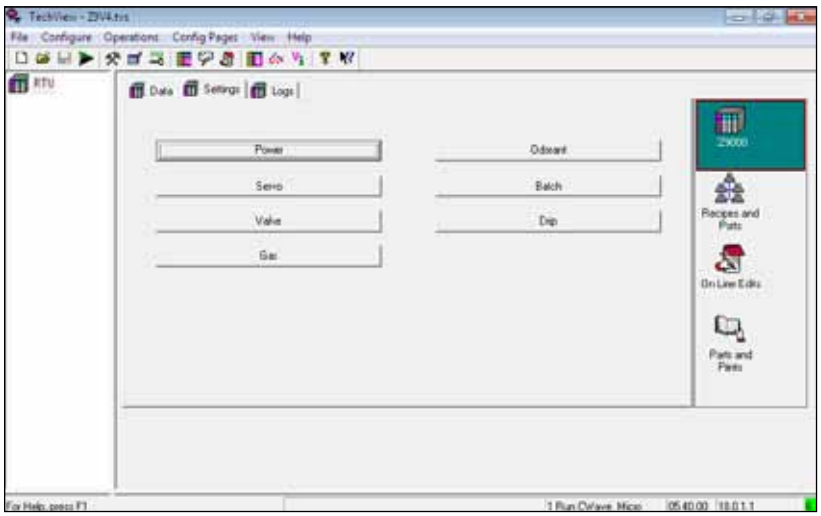

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
10 . 0 . 1 . 23
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

e. Click OK to save the changes.

3. Connect a crossover cable from the Ethernet port on your computer to the E1 port on the odorizer's RTU.
4. Open the TechView file, C:\ZeckSystems3\TechView\Z9V4.tvs.
5. In the SignOn to RTU dialog box, enter the default user name (MVZ) and password (122654), and then click **Signon** to connect with the unit.
   - If the unit does not connect properly, check that the IP address is correct (see step 2) and that you are using a crossover cable, or call Sentry Equipment Corp for assistance.
6. Continue with section 2.2 Configure Using TechView.

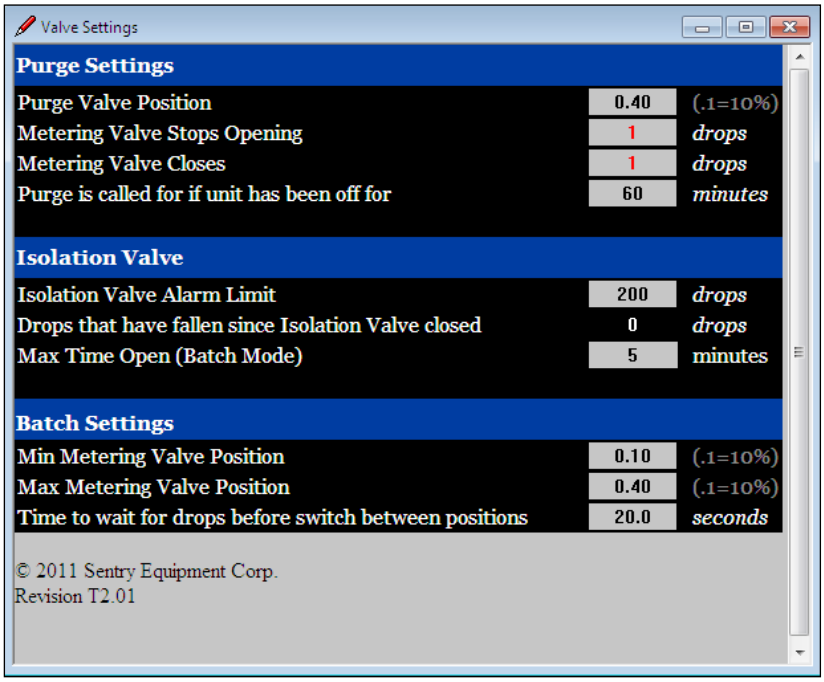
2.2 Configure Using TechView

To configure the Z9000 using TechView, sign on to the software and, from the main screen, select the Settings tab.



2.2.1 Valve Settings

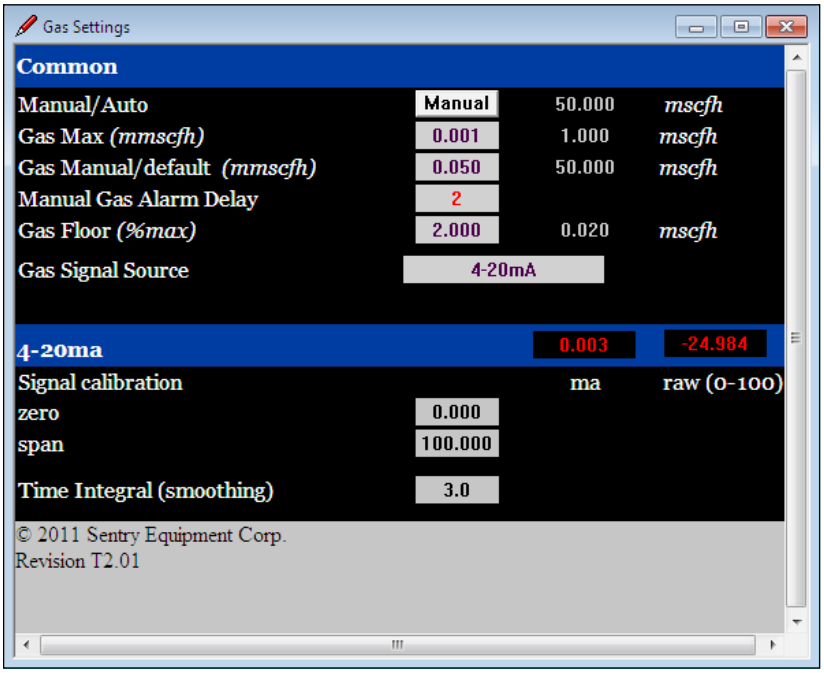
1. From the Settings tab, select the **Valve** button. The Valve Settings screen appears.


Valve Settings
Purge Settings
Purge Valve Position 0.40 (.1=10%)
Metering Valve Stops Opening 1 drops
Metering Valve Closes 1 drops
Purge is called for if unit has been off for 60 minutes
Isolation Valve
Isolation Valve Alarm Limit 200 drops
Drops that have fallen since Isolation Valve closed 0 drops
Max Time Open (Batch Mode) 5 minutes
Batch Settings
Min Metering Valve Position 0.10 (.1=10%)
Max Metering Valve Position 0.40 (.1=10%)
Time to wait for drops before switch between positions 20.0 seconds
© 2011 Sentry Equipment Corp.
Revision T2.01

2. Set the following parameters found under the Batch Settings header:
   - Min Metering Valve Position: minimum position while in batch mode
   - Max Metering Valve Position: maximum position while in batch mode.
   - Time to wait for drops before switch between positions: max time between batch mode drops before position change
3. Close the Valve Settings screen.

2.2.2 Gas Settings

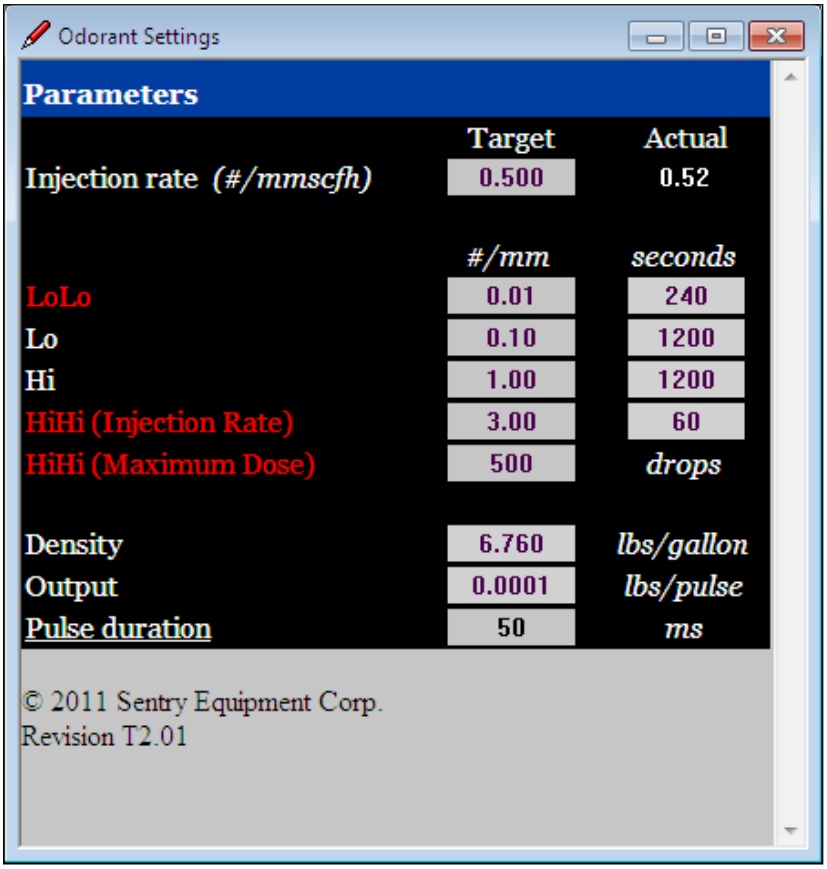
1. From the Settings tab, select the **Gas** button. The Gas Settings screen appears.



2. Set the following parameters found under the Common header:
   - Manual/Auto: If there is a flow signal, set to Auto. Otherwise, set to Manual.
   - Gas Max (mmscfh): If using 4-20 mA signal for gas flow, set this as the gas flow at 20 mA.
   - Gas Manual/default (mmscfh): Set as the assumed flow rate if there is no flow signal.
   - Gas Floor (%max): This is the percent of the Gas Max setting at which the odorizer assumes zero flow. Set this value so that a known low flow condition is not interpreted as zero flow.
   - Gas Signal Source: Select the setting that indicates how the odorizer receives the flow signal.
3. Close the Gas Settings screen.

2.2.3 Odorant Settings

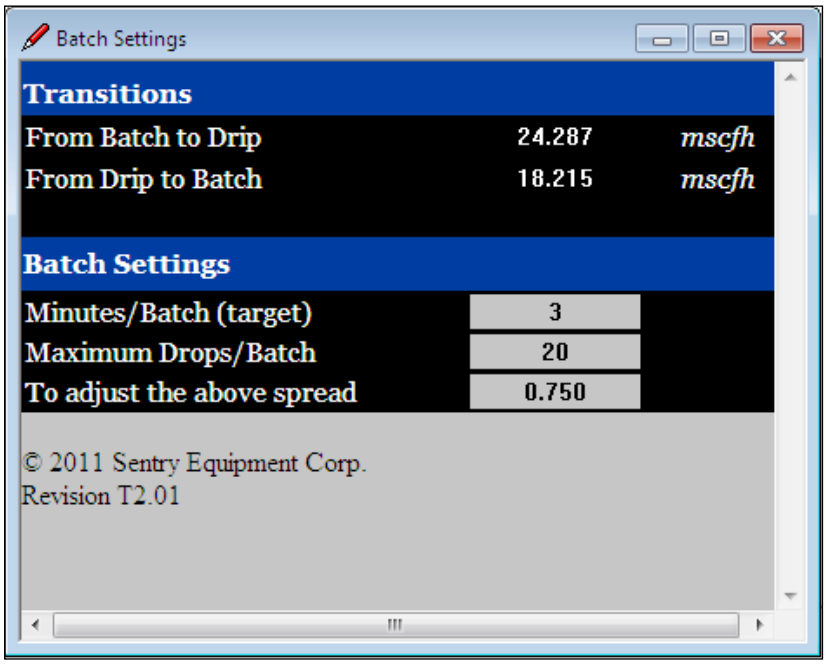
1. From the Settings tab, select the Odorant button. The Odorant Settings screen appears.



2. Set the following parameters:
   - Injection Rate (#/mmscfh): Set Target to the desired injection rate.
   - Output (lbs/pulse): If a pulse is received to track odorant injected, set the number of pounds per pulse.
3. Close the Odorant Settings screen.

2.2.4 Batch Settings

1. From the Settings tab, select the Batch button. The Batch Settings screen appears.



2. The parameters under the Transitions header are calculated based on the values entered under the Batch Settings header:
   - From Batch to Drip: (this is a calculated setting) flow rate at which the odorizer changes from batch mode to drip mode
   - From Drip to Batch: (this is a calculated setting) flow rate at which the odorizer changes from drip mode to batch mode
   - Maximum Drops/Batch: maximum number of drops allowed per batch
3. Close the Batch Settings screen.

2.3 Configure Using Local Display

For information on how to navigate using the local display, please see Section 5.1 Navigating the Local Display.

2.3.1 Settings Menu

Press the blue Setting key to access the Settings Menu. This menu has two screens. Page down (7) to see the second screen.

2.3.2 Odorant Settings

1. From the first page of the Settings Menu, press 3 to select the Odorant menu.

2. Page down (7) to go to Odorant Settings screen 1 (O1).
3. Set Target #/mm to the desired injection rate.

4. If a pulse is received to track odorant injected, page down (7) to screen O2, then cursor down (5) to Output #/p and enter the number of pounds per pulse.

5. When finished configuring Odorant settings, press the blue Setting key to return to the Settings Menu.

2.3.3 Gas Settings

1. From the first page of the Settings Menu, press the #4 key to access the Gas Settings screen G1:
   - Gas Mode: If there is a flow signal, set to Auto. Otherwise, set to Manual. Use the toggle (8) key to switch between Auto and Manual.
   - Gas_man/def: Set as the assumed flow rate if there is no flow signal.

2. Page down (7) to screen G2:
   - ManGasAlrmDly: Set the number of hours the unit is allowed to operate in Manual Mode before an alarm is generated.
   - Gas_max: If using 4-20mA signal for gas flow, set this as the gas flow at 20mA.

3. Page down (7) to screen G3:
   - Gas_zero: This is the percent of the Gas_max setting at which the odorizer assumes zero flow. Set this value so that a known low flow condition is not interpreted as zero flow.

4. Page down (7) to screen G4:
   - Signal type: Select the setting that indicates how the odorizer receives the flow signal.

5. When finished configuring Gas settings, press the blue Setting key to return to the Settings Menu.

2.3.4 Valve Settings

1. From the second page of the Settings Menu, press 1 to access the Valve Settings screens. Navigate to screen V2:
   - Batch Max: Maximum metering valve position while in batch mode.
   - Batch Min: Minimum metering valve position while in batch mode
   - Cycle Time: Time to wait for drops before switching between positions

2. When finished configuring Valve settings, press the blue Setting key to return to the Settings Menu.

2.3.5 Batch Settings

1. From the second page of the Settings Menu, press 2 to access the Batch Settings screen B1:
   - Drops_allowed: Maximum number of drops allowed per batch

2. Page down (7) to screen B2:
   - B→D: Flow rate at which the odorizer changes from batch mode to drip mode; this is a calculated setting
   - D→B: Flow rate at which the odorizer changes from drip mode to batch mode; this is a calculated setting
   - Change the Deadband value to adjust the Batch-to-Drip and Drip-to-Batch settings, if necessary.

3. When finished configuring Batch settings, press the blue Setting key to return to the Settings Menu.

3. Common Operations

There are several common operations that may need to be performed on an occasional basis. These operations are detailed below.

3.1 Calibrate Optical Comparator

As drops fall through the drip chamber past the optical arrays, a signal is sent to the optical comparator and the yellow light on the comparator flashes.

To calibrate the optical comparator, the technician must manually turn the gain adjustment screw on the optical comparator (a jeweler's flat head screwdriver is recommended) and visually verify that the yellow light flashes each time a drop falls.

➲ Note:
The best way to make these adjustments is to manually get the drops to fall at a constant rate and then see how the yellow light flashes: it should flash at the same rate that drops are falling. If it is not flashing, gain needs to be increased; if it is flickering, gain needs to be decreased.

If the optical comparator is not sensitive enough, increase the gain by turning the gain adjustment screw clockwise.

If the optical comparator is too sensitive, decrease the gain by turning the gain adjustment screw counter clockwise.

3.2 Calibrate Servo

3.2.1 TechView

1. Ensure Z9000 is turned off.
2. Open the Servo Settings screen (Z9000 Settings tab).
3. Click the Arm Calibration button.
4. Within 10 seconds, click the Execute Calibration button.
   - If there is not already a motor type alarm displayed, one is generated.
5. Remove the Servo by unscrewing the three bolts holding it to the metering valve housing and set it down in the enclosure.
6. Click the OK button for the field labeled “Click When Servo Unbolted.”
   - The servo should start spinning. The “Calibration Status” field displays the message “Calibration Started” followed by the timestamp.
7. Reach into the area where the metering valve coupling and “spider” are and turn counter-clockwise until the metering valve is full open.
8. Click the OK button for the field labeled “Click when Valve Full Open.”
9. Reattach the Servo. The bolts should be finger tight only.
10. Click the OK button for the field labeled “Click when Servo Reattached.”
11. The Servo begins to close the metering valve.
    - If the metering valve is able to close, the field labeled “Calibration Status” indicates “Calibration OK” followed by the timestamp. The Motor Type alarm clears and it is possible to start the unit.
    - If the metering valve is not able to close sufficiently, the field labeled “Calibration Status” indicates “Calibration Failed” followed by the timestamp. The Motor Type Alarm does not clear, and it is not possible to start the unit until a successful calibration is completed.

3.2.2 Local Display

1. Ensure Z9000 is turned off.
2. Navigate to the first Servo Calibrate screen (S1).
   - Press the blue Setting key
   - Page down (7) to M2
   - Select 3. Servo
3. With the cursor under the setting for the Arm field, toggle (8) setting to Yes.
4. Within 10 seconds, cursor down (5) to the setting for the Execute field and toggle (8) setting to Yes.
5. Page down (7) to the next Servo Calibrate screen (S2).
6. Remove the Servo by unscrewing the three bolts holding it to the metering valve housing and set it down in the enclosure.
7. With the cursor under the setting for the field labeled "Disconnected?", toggle (8) setting to Yes.
   - The servo should start spinning.
8. Reach into the area where the metering valve coupling and "spider" are and turn counter-clockwise until the metering valve is full open.
9. Cursor down (5) to the setting for the field labeled "Valve Open?" and toggle (8) setting to Yes.
10. Reattach the Servo. The bolts should be finger tight only.
11. Cursor down (5) to the setting for the field labeled "Reattached?" and toggle (8) setting to Yes.
12. The Servo begins to close the metering valve.
13. Check the Mot Typ alarm status (press the red Alarm key, then page down (7) to screen A7).
    - If the metering valve is able to close, the Mot Typ alarm status reads OK, and it is possible to start the unit.
    - If the metering valve is not able to close sufficiently, the Mot Typ alarm status reads Alarm, and it is not possible to start the unit until a successful calibration is completed.

3.3 Change Injection Rate

3.3.1 TechView

1. From the Z9000 Settings tab, click the Odorant button to bring up the Odorant Settings screen.
2. Click in the gray field for Target Injection Rate and enter the desired injection rate in #/MMSCFH.
3. Be sure to hit Enter to save the new value.

3.3.2 Local Display

1. Select Setting (blue button)
2. On the first Setting Menu (M1), select 3. Odorant
3. Page down (7 key with down arrow) to screen O1
   - Target #/mm x.xxx is displayed with a cursor under the first digit.
4. Press Clear (yellow button)
5. Type in the desired number of pounds per mm
   - For an injection rate of .45 #/mmcf, press 4, 5, 0. the screen should display 0.450 #/mm
   - For an injection rate of .5 #/mmcf, press 5,0,0. The screen should display 0.500 #/mm.
6. Press Enter
7. Page down (7) until you return to the main screen.

3.4 Change Manual Flow Rate

3.4.1 TechView

1. From the Z9000 Settings tab, click the Gas button to bring up the Gas Settings screen.
2. Click on the Manual/Auto button until it displays Manual.
3. Click in the gray field for Gas Manual/Default (mmscfh) and enter the desired manual gas flow rate.
4. Be sure to hit Enter to save the new value.

3.4.2 Local Display

1. Select Setting (blue button)
2. On the first Setting Menu (M1), select 4. Gas
3. The cursor is under the first letter of the Gas Mode setting: Manual or Auto. Use the toggle key (8) to switch between manual and automatic modes.
4. Use the cursor down key (5) or cursor up key (4) to move the cursor between the Gas Mode and Gas_man/def lines.
5. With the cursor on the Gas_man/def line, press the Clear (yellow) button.
6. Enter the flow rate in mmcfh (million cf/hour) using the number keys.
   - For 10 mscfh (.01 mmcfh), press 1,0,0, then Enter. The value should display 0.0100 on the Gas_man/def line, and (mscfh) 10.000 directly underneath it.
   - For 30 mscfh flow rate (.03 mmcfh), press 3,0,0, then Enter. The value should display 0.0300 on the Gas_man/def line, and (mscfh) 30.000 directly below it.
7. Press Enter.
8. Page down (7) until you return to the main screen.

3.5 Clear Alarms

3.5.1 TechView

1. From the Z9000 Data tab, click the Alarms button to bring up the Alarms screen. If an alarm is active, the status indicator is red.
2. Note which alarms have been triggered, and correct the alarm conditions. (See Section 6. Troubleshooting.)
3. Click the Clear button in the upper right-hand corner of the screen to acknowledges and clear all active alarms. This also resets the number of Auto Clears used to 0.
4. Verify that the alarms were cleared. Alarms must be cleared before a restart is possible.
5. Go to the Z9000 Overview page and click the *Click to Turn On* button. The color indicator next to the button turns from red to green to show that the unit is ON.

3.5.2 Local Display

If in alarm, the red light on the top of the display is solid red.

1. Select Alarm (red button)
2. Page down (7) through the eight pages of possible alarms, noting which alarms have been triggered.
3. Correct the Alarm Condition(s). (See Section 6. Troubleshooting.)
4. Press the Alarm (red) button again.
5. Acknowledge the alarms by pressing the SK (black) button.
6. Verify that the alarms were cleared by scrolling through the alarms pages again until you are returned to the main screen.
7. If all of the alarms were cleared, press the On/Off (green) button to restart the odorizer.

3.6 Fill the Tank

3.6.1 Local Display only

1. Press the On/Off (green) button to turn the odorizer off.
2. Turn off the odorant supply valve.
3. Turn off the blanket gas supply valve.
4. Flare off the tank's blanket pressure.
5. Fill the tank.
6. Turn on the blanket gas supply valve.
7. Turn on the odorant supply valve.
8. Check and acknowledge any alarms.
9. Press the green On/Off button to turn the odorizer back on.
10. Select Setting (blue button).
11. On the first Setting Menu (M1), select 3. Odorant.
12. Press the SK (black) button.
13. Page down (7) to the Gallons screen.
14. Position the cursor under the value for Initial. Change this value to reflect the amount of odorant in the filled tank.
15. Page down (7) until you return to the main screen.

3.7 Save/Load Recipe File

3.7.1 Save Recipe File (TechView only)

The odorizer's recipe files need to be saved before upgrading the firmware or changing the battery.

1. Open and logon to TechView.
2. On the right hand side of the screen, select the Recipes and Ports page group.
3. On the Recipes tab, click Load/Save Recipes. The Z9000 Recipes screen appears.
4. On the Recipes screen, click Change Filename.
5. Select the recipe file (*.rcp) you would like to save. If there is no recipe file specific to the location, begin with the default recipe file (Recipe.rcp).
6. Click "Read from File." The recipe file loads in the lower part of the screen.
   - If the filename needs to be changed, do so now, then click "Write to File."
7. Once the file is open, click "Read from RTU."
8. Click "Write to File." A status message at the bottom of the screen shows when write to file is successful.

3.7.2 Load Recipe File (TechView only)

1. Open and logon to TechView.
2. On the right hand side of the screen, select the Recipes and Ports page group.
3. On the Recipes tab, click Load/Save Recipes. The Z9000 Recipes screen appears.
4. On the Recipes screen, click "Change Filename."
5. Use the browser to select the previously saved file for this site, then click "Read from File." The recipe file loads in the lower part of the screen.
6. Once the file is open, click "Write to RTU."
7. Screen goes gray, then back to normal.

3.8 View Odorant Level

3.8.1 TechView

1. From the Z9000 Data tab, click the Odorant Usage button to open the Odorage Usage screen. The Virtual Level Gage section at the bottom of the screen displays odorant level information.
2. Starting Tank Volume is the amount of odorant (in pounds) that was put into the bulk tank.
3. Tank Volume Remaining displays the level in text format, and the blue bar across the bottom acts as a visual gauge.

3.8.2 Local Display

1. Select Setting (blue button)
2. On the first Setting Menu (M1), select 3. Odorant
3. Press the SK (black) button
4. Page down (7) to the Gallons screen
   - Initial: The amount of odorant that was put into the bulk tank.
   - Used: The amount of odorant (in pounds) that has been used since the bulk tank was filled.
   - Remaining: The amount of odorant (in pounds) that is left in the bulk tank.
5. Page down (7) until you return to the main screen.

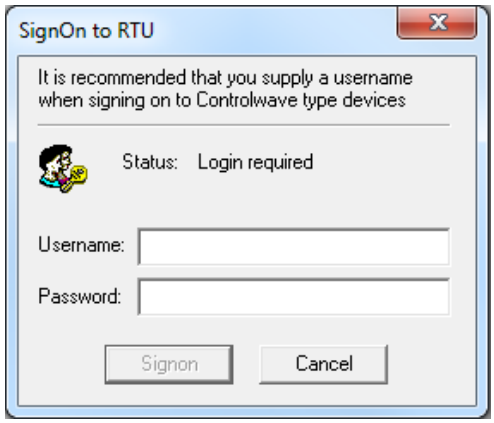
4. TechView Software

The TechView software package allows a technician to calibrate a transmitter locally or via communication with the transmitter's master controller (RTU), perform basic operations, and collect real-time or historical data.

TechView can be installed on a portable laptop computer to allow the technician to bring it to the site of the RTU/transmitter, or it can be installed on a desktop computer for bench configuration of a transmitter.

4.1 Starting the Software

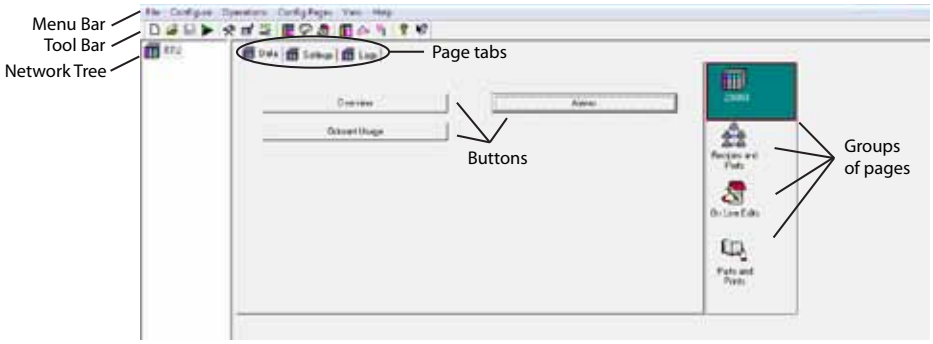
1. Open TechView.
   The default location is C:\ZeckSystems3\Techview\Z9v4.tvs.
2. Enter the user name and password in the dialog box that appears, then click SignOn.
   The default user name is MVZ.
   The default password is 122654.



4.2 General Navigation

There are several ways to navigate information in TechView:

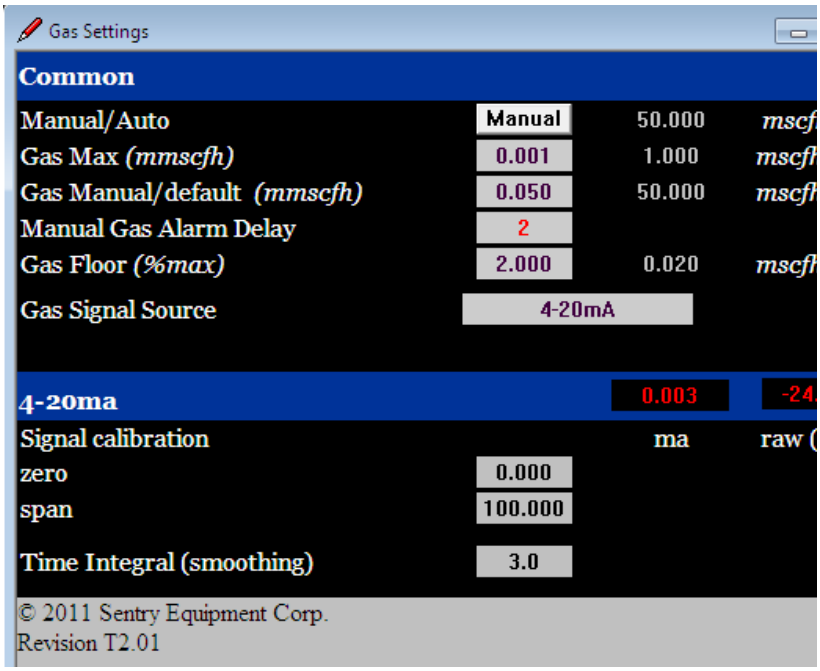
- Menu bar provides dropdown menus
- Tool bar contains shortcuts for various functions
- Page tabs allow access to different pages within a group
- Buttons provide access to customized TechView screens
- Pages are grouped together by type, and these groups are accessible via icons on the right side of the screen



The TechView screens also contain several different interactive elements. For example, the Gas Settings screen contains

- a toggle button to switch between Manual and Auto modes of operation;
- a button to access a dropdown list to choose between different Gas Signal Sources;
- several fields for entering various parameters. (To change the value of a parameter, click into the field to select it, type in the desired value, then press Enter.)

➲ Note:
It may take a moment for the value of a button or field to refresh after changing a setting.

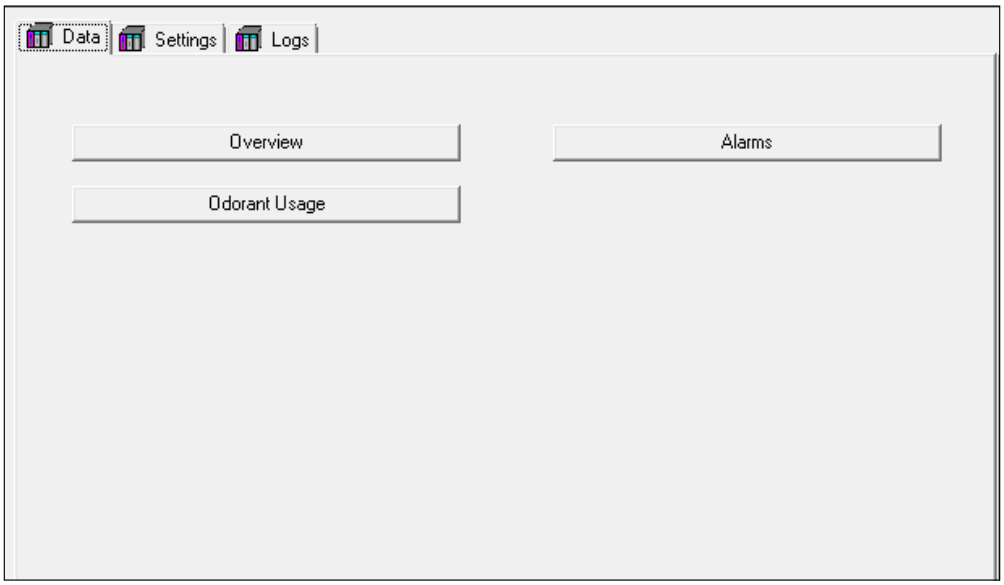


4.2.1 Context-Sensitive Help

The TechView screens have a built-in Help feature. The field names are hyperlinks. As the cursor passes over a field name, the words become underlined. Clicking on an underlined field name opens the help screen.

4.3 Z9000: Data

The Data tab gives the user access to the Overview, Odorant Usage, and Alarms screens.



Z9000 Overview
0
unassigned
Control
Click to Turn On
Odorant Injection Rate
(#/mm)
Alarm
Target
Purge
Measured
0.000
Gas flow rate (mscfh)
500.000
Valve Positions
Target
0.05
Actual
0.05
Ceiling
0.95
Floor
0.05
Current
0.00
mA
Isolation Valve
Closed
Drops
Seconds since last drop
0
Seconds between last drops
0.000
Drip Mode
Drops until adjustment (drip)
1
Versions
Click to Lock
Operational comments
01/31/2012
08:40:32
5.40
4_32
(xxx) xxx-xxxx
Contact Name 1
(xxx) xxx-xxxx
Contact Name 2
© 2011 Sentry Equipment Corp.
Revision T2.01

4.3.1 Z9000 Overview Screen

Control

Click to Turn On/Off: Toggle button allows users to turn unit on and off. The color indicator next to the button displays the operational status off the unit. Green is ON. Red is OFF.

Alarm: An active Alarm status is indicated by a red bar. If the unit is off, the Alarm is active by default. To view a specific alarm, if present, go to the Z9000 Alarms Screen.

Purge: An active Purge routine is indicated by a yellow bar. In Drip Mode, if the unit has been off for a given time, a purge routine makes sure that the inlet odorant line is gas free.

Gas flow rate (mscfh): In Auto mode, displays the current gas flow rate as measured by an external signal.

Odorant Injection Rate (#/mm):

- *Target:* Desired injection rate in pounds per million.
- *Measured:* Actual injection rate of the unit shown in relation to the target injection rate as well as in numeric form below. In batch mode, the measured injection rate does not show up until the first cycle is completed.

Valve Positions

Target: Position command issued by the Controller to the Servo. 1= 100% (.00-1.00).

Actual: Actual position of the metering valve based on feedback from the Motion Controller. 1=100% (.00-1.00).

Ceiling: Highest position command the metering valve is allowed to issue.

Floor: Lowest position command the metering valve is allowed to issue.

Current: The current (mA) being consumed by the motion controller and servo.

Isolation Valve: Indicates whether the isolation valve is Open or Closed. During Drip Mode it remains open. During Batch Mode it open when “mscf until next batch” reaches zero (0); it closes again when the delivered dosage satisfies demand.

Drops

Seconds since last drop: Time (in seconds) that has elapsed since a drop fell.

Seconds between last drops: Time (in seconds) between the last two drops that fell.

Batch/Drip Mode: Indicates the mode in which the unit is operating.

Drops until adjustment: (Drip Mode)Number of drops remaining until the valve position adjusts.

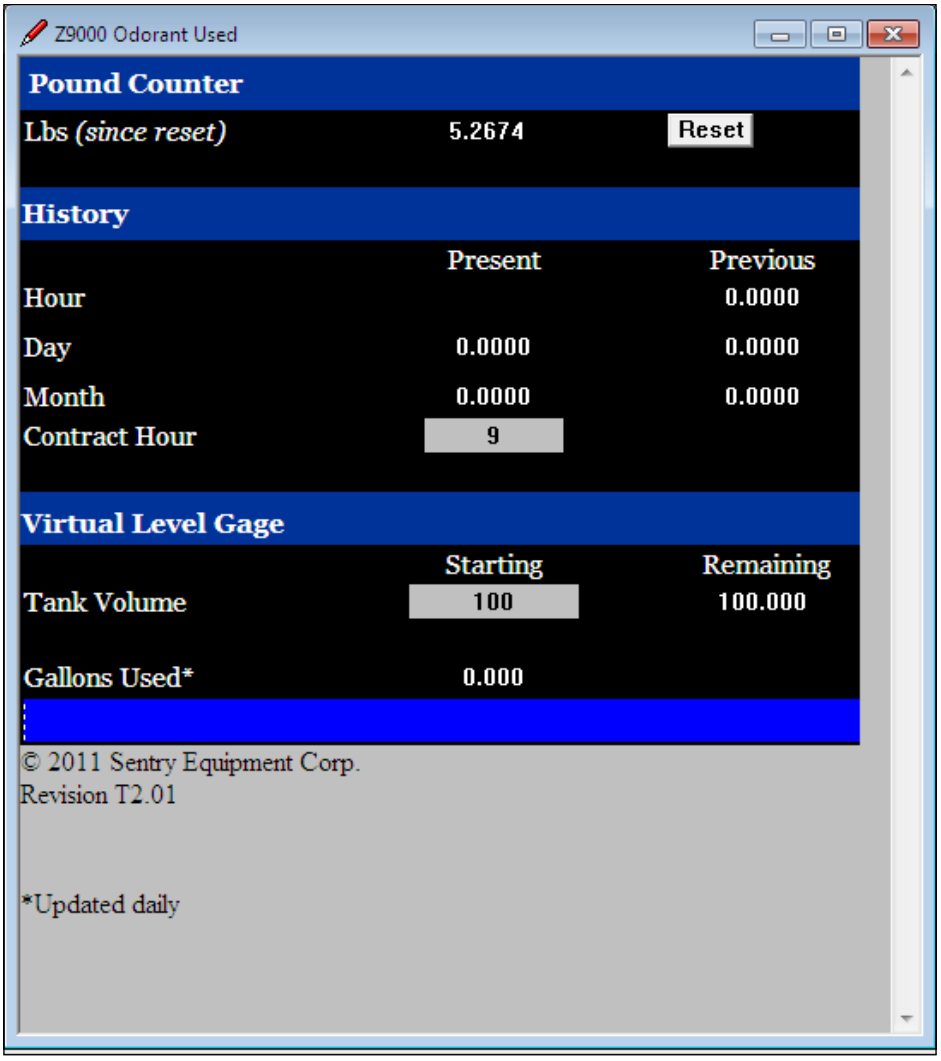
Mscf until next batch: (Batch Mode - not shown) Amount of gas that must flow past before all drops that have fallen are consumed. This number decreases as gas flows, and increases when drops fall.

Drops for next batch: (Batch Mode - not shown) Target number of drops to fall when the isolation valve opens. While the isolation valve is closed, this number is recalculated. Changes to its value are normal.

Drops in this batch: (Batch Mode - not shown) Actual number of drops delivered since the isolation valve last opened.

Versions

Click to Lock/Unlock: This is the Local Lock to prevent accidental operation of the unit during maintenance or other operations.


Z9000 Odorant Used
Pound Counter
Lbs (since reset)
5.2674
Reset
History
Present
Previous
Hour
0.0000
Day
0.0000
0.0000
Month
0.0000
0.0000
Contract Hour
9
Virtual Level Gage
Starting
Remaining
Tank Volume
100
100.000
Gallons Used*
0.000
© 2011 Sentry Equipment Corp.
Revision T2.01
*Updated daily

4.3.2 Z9000 Odorant Used Screen

Pound Counter

Lbs (since reset): Pounds of odorant injected since the Reset button was pushed. Resetting the counter does not affect the information displayed in History.

History

Hour:

Present: The number of pounds of odorant that have fallen in the past hour (resets on the hour)

Previous: The number of pounds of odorant that fell during the previous hour

Day:

Present: The number of pounds of odorant that have fallen during the current day (starting at midnight)

Previous: The number of pounds of odorant that fell during the previous day

Month:

Present: The number of pounds of odorant that have fallen during the current month (starting on the first day of the month)

Previous: The number of pounds of odorant that fell during the previous month

Contract Hour: The time when one fiscal day ends and the next begins.

Virtual Level Gage

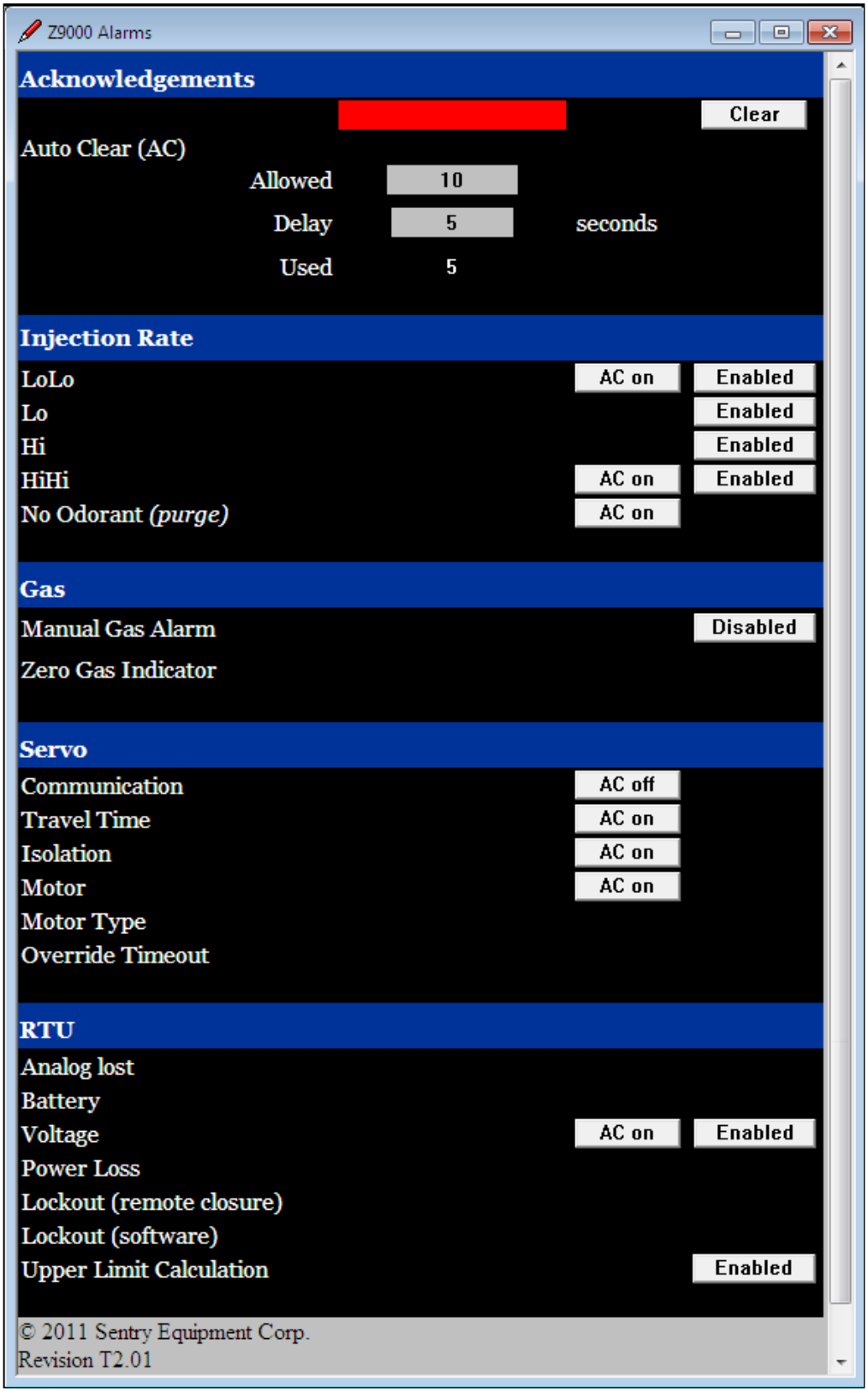
Tank Volume:

Starting: The empty volume (in gallons) of the odorant bulk storage tank. This value must be entered manually.

Remaining: The remaining volume of odorant currently in the tank.

Gallons Used: The calculated vapor space in the tank. This is calculated and reduced daily, based on pounds of odorant reported by the odorizer.

The blue bar across the bottom acts as a virtual level gage. This is an approximation of the level for convenience and is not intended to replace an actual level gage.


Z9000 Alarms
Acknowledgements
Clear
Auto Clear (AC)
Allowed
10
Delay
5
seconds
Used
5
Injection Rate
LoLo
AC on
Enabled
Lo
Enabled
Hi
Enabled
HiHi
AC on
Enabled
No Odorant (purge)
AC on
Gas
Manual Gas Alarm
Disabled
Zero Gas Indicator
Servo
Communication
AC off
Travel Time
AC on
Isolation
AC on
Motor
AC on
Motor Type
Override Timeout
RTU
Analog lost
Battery
Voltage
AC on
Enabled
Power Loss
Lockout (remote closure)
Lockout (software)
Upper Limit Calculation
Enabled
© 2011 Sentry Equipment Corp.
Revision T2.01

4.3.3 Z9000 Alarms Screen

> **➲ NOTE:**
> *Some alarms may be disabled. If disabled, the alarm condition is not monitored. Certain alarms can be allowed to clear automatically. Toggle the AC on/off button to allow/disallow the Auto Clear function.*

Acknowledgements

Status Indicator: If alarm is active, indicator is RED. If there are no alarms, it is blank.

Clear Button: Clicking button acknowledges and clears all active alarms. Alarms must be cleared before a restart is possible. This also resets the number of Auto Clears used to 0.

Auto Clear (AC):

Allowed: The number of times the Z9000 automatically resets the Alarm and tries again.

Delay: The number of seconds between Auto Clears.

Used: The number of times Auto Clear has been used. This value resets when the Clear button is clicked.

Injection Rate

Parameters for these alarms are set under the Odorant Settings page.

LoLo: If the injection rate falls too low for a prolonged period, the Z9000 activates this alarm. An auto clear is used. This alarm can be disabled.

Lo: If the injection rate is low but still functional, the Z9000 triggers an alarm but continues operation and attempts to increase the injection rate. This alarm can be disabled.

Hi: If the injection rate is elevated but functional, the Z9000 triggers an alarm but continues operation and attempts to decrease the injection rate. This alarm can be disabled.

HiHi: If the injection rate becomes too high, the Z9000 trips this alarm and the unit uses an auto clear. This alarm can be disabled.

No Odorant (purge): During the Purge Routine, if no drops fall within a given time period this alarm triggers and the unit uses an Auto Clear.

Gas

Manual Gas Alarm: Triggered if unit remains in Manual mode for more than the allowed length of time..

Zero Gas Indicator: Triggered when unit shows gas flow rate of zero. Alarm alerts technician to check that the odorizer is correct to see zero flow. Alarm clears when flow returns. This alarm can be disabled.

Servo

Communication: Servo is unable to communicate with COM1 of the controller. An Auto Clear is used. This alarm can be disabled.

Travel Time: If valve does not reach target position within defined time period, unit uses AC. Alarm can be disabled. This is generally paired with a Communication or Motor alarm.

Isolation: Occurs when isolation valve has closed but too many drops continue to fall. It is not unusual for a few drops to fall after isolation valve closes. The number of drops allowed to fall is set on the Valve Settings page. The unit uses an Auto Clear.

Motor: Servo used too much current attempting to move. This current can be seen on the Power Settings page. This alarm is expected during a warm start. This alarm uses an Auto Clear.

Motor Type: Servo type has changed and a servo calibration is required. There is no Auto Clear; calibration clears the alarm.

NOTICE

Never unplug a Servo with power on the Z9000. This could ruin the Servo.

Override Timeout: Servo override has a 24-hour timeout allowed. The operator must acknowledge this condition every 24 hours or this alarm occurs. The unit continues to operate, but the alarm is active and recorded in the audit trail.

RTU

Analog lost: The 4-20 mA flow signal has fallen below 4 mA. If this alarm is triggered, the Z9000 assumes Default Gas flow. The alarm clears when the signal returns.

Battery: Battery on the RTU has died. If power is lost, retained variables reset to defaults.

> **➲ Note:**
> *Keep an extra battery in the cabinet. Make/store a recipe file to be able to restore lost variables if needed.*

Voltage: If the voltage to the RTU falls below the allowable limit, this alarm disables the Servo Motor. The limit is set under the Power Settings page. The unit uses an auto clear. This alarm can be disabled.

Power Loss: The Z9000 has turned off because of an interruption to the power supply.

Lockout (remote closure): Prevents unit from being used (red tag lockout).

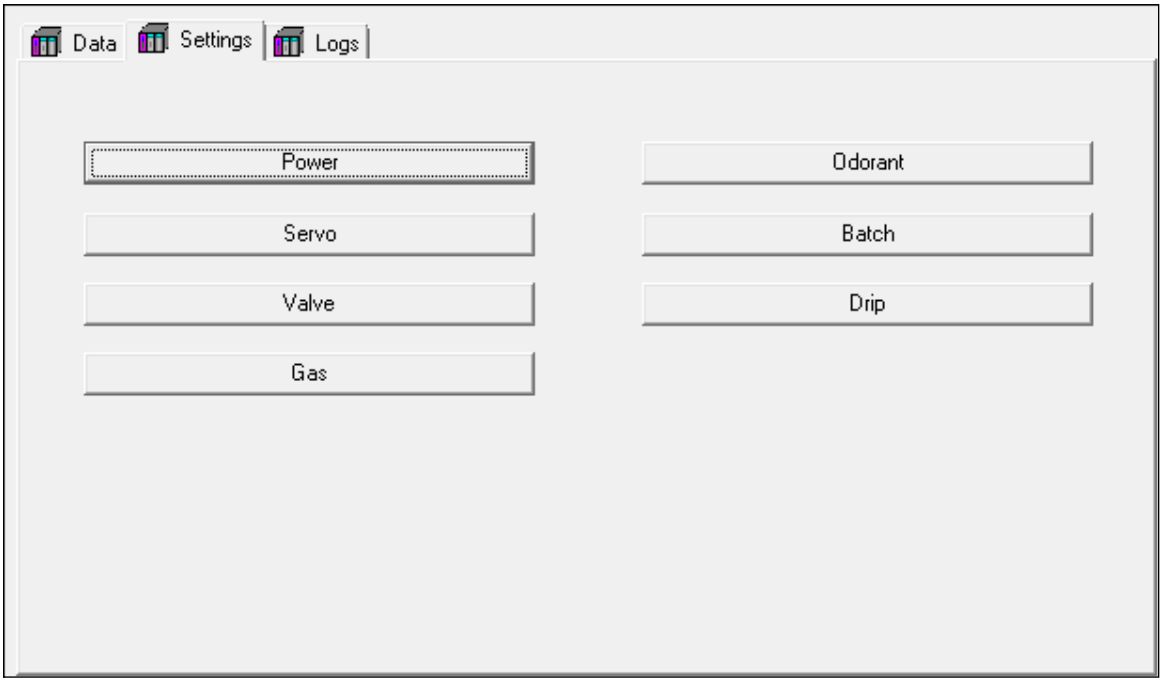
Lockout (software): Prevents unit from being used (red tag lockout). This signal is toggled on the Overview screen. This prevents accidental operation of the unit during maintenance or other operations.

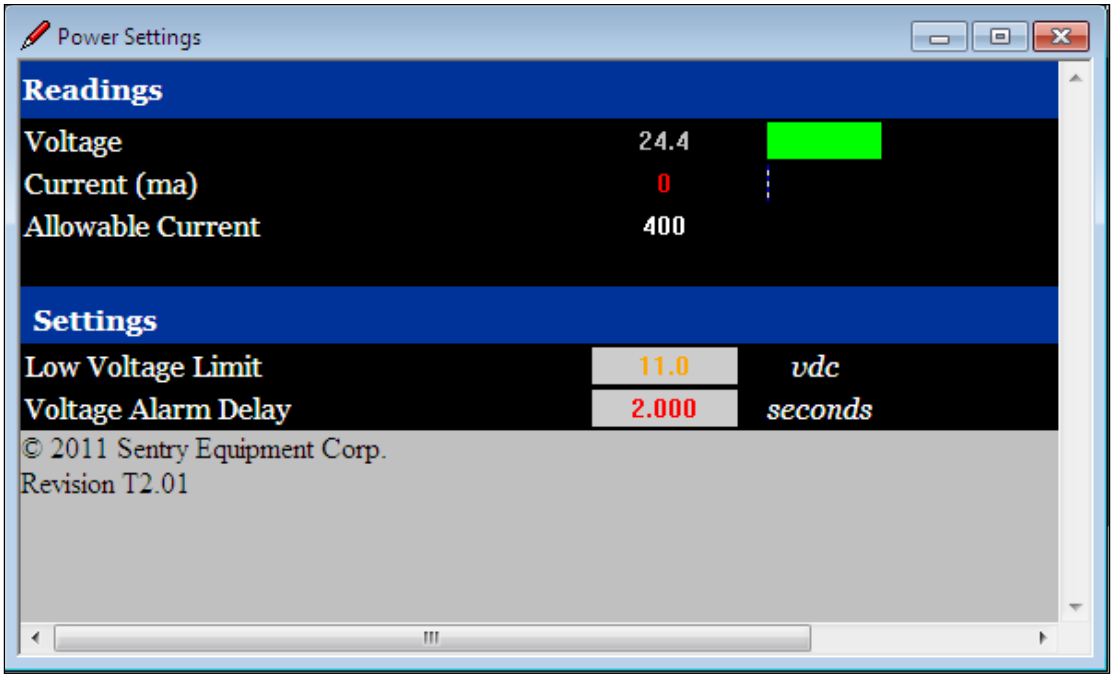
Upper Limit Calculation: If the user input values exceed the functional capabilities of the Z9000, this alarm prevents operations. The odorizer cannot start without an override. This alarm can be disabled.

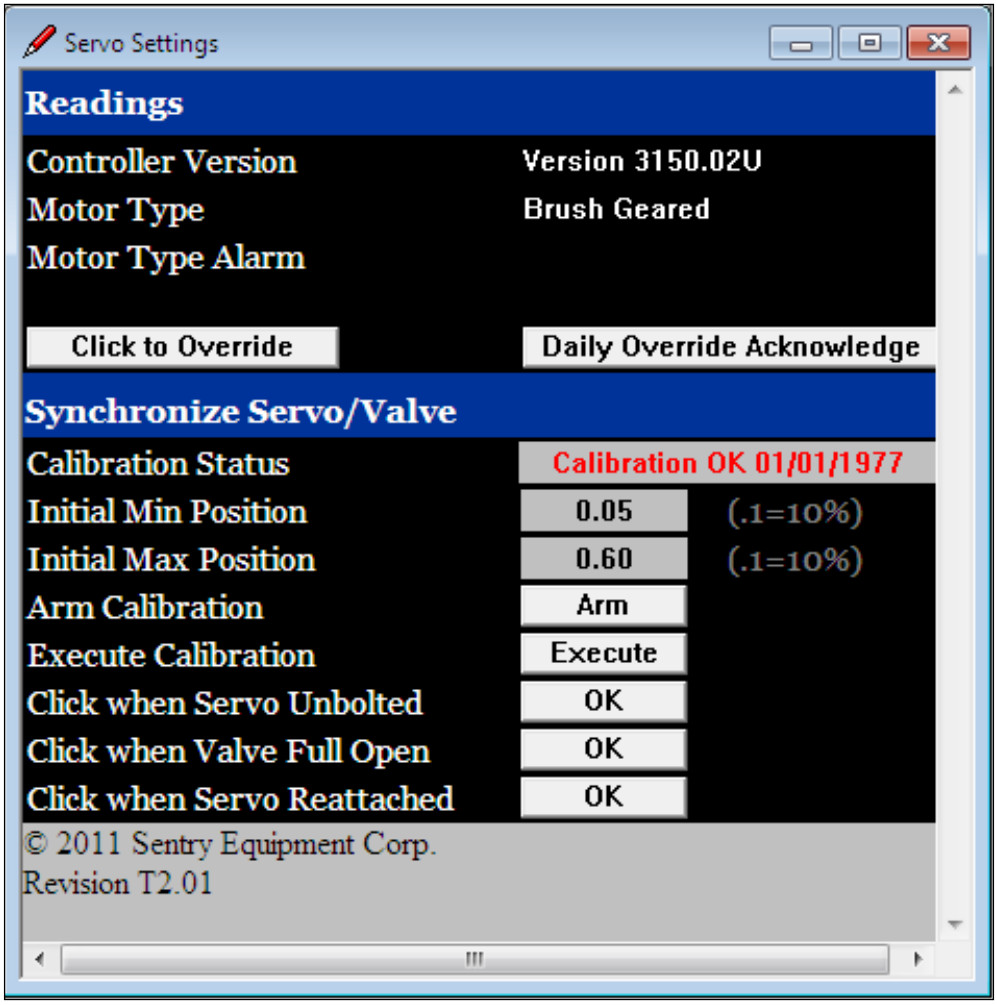
4.4 Z9000: Settings

The Settings tab allows the user access to the following screens:

- Power Settings
- Servo Settings
- Valve Settings
- Gas Settings
- Odorant Settings
- Batch Settings
- Drip Settings




Power Settings
Readings
Voltage
24.4
Current (ma)
0
Allowable Current
400
Settings
Low Voltage Limit
11.0
vdc
Voltage Alarm Delay
2.000
seconds
© 2011 Sentry Equipment Corp.
Revision T2.01


Servo Settings
Readings
Controller Version
Version 3150.02U
Motor Type
Brush Geared
Motor Type Alarm
Click to Override
Daily Override Acknowledge
Synchronize Servo/Valve
Calibration Status
Calibration OK 01/01/1977
Initial Min Position
0.05
(.1=10%)
Initial Max Position
0.60
(.1=10%)
Arm Calibration
Arm
Execute Calibration
Execute
Click when Servo Unbolted
OK
Click when Valve Full Open
OK
Click when Servo Reattached
OK
© 2011 Sentry Equipment Corp.
Revision T2.01

4.4.1 Power Settings Screen

Readings

Voltage: Amount of voltage being supplied to the unit. The color indicator is green when the servo is moving, red when the servo is stopped.

Current: This value is live and displays the current (mA) being consumed by the motion controller and servo..

Allowable Current: Maximum current the servo is allowed to use.

Settings

Low Voltage Limit: Level at which a low voltage alarm is triggered and the servo is disabled.

Voltage Alarm Delay: Length of time (in seconds) the low voltage condition may exist before a low voltage alarm is triggered.

4.4.2 Servo Settings Screen

Readings

Controller Version: This is the motor controller version of the servo in the unit.

Motor Type: This displays the recognized servo type and automatically installs the correct parameters. Calibration is required every time the servo type changes.

Motor Type Alarm: Indicates that the servo type has changed. Servo calibration is required.

Click to Override: Clicking this button disables the servo alarms to allow the valve to be placed in a manual position to allow continued odorization in the event of a servo failure, until the failed equipment can be replaced. The Z9000 generates a daily alarm to remind the operator that the unit should not be left in this condition long term.

Daily Override Acknowledge: Clicking this button clears the override alarm discussed in the previous section.

Synchronize Servo/Valve

Calibration Status: One of the following messages is displayed:

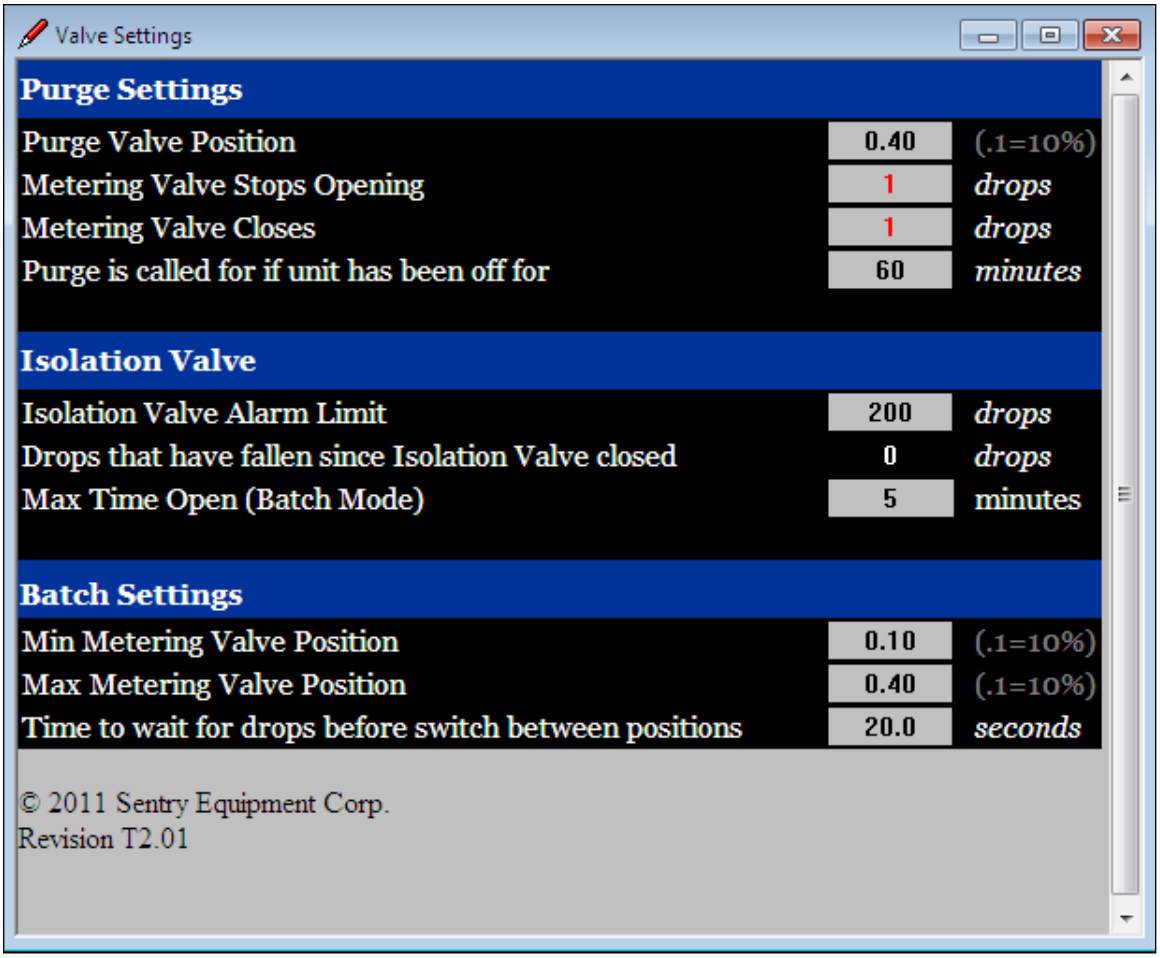
- *Servo Not Calibrated*
- *Calibration OK (followed by time of successful calibration)*
- *Calibration failed (followed by time of failed calibration attempt)*

If the Z9000 does not display Calibration OK, the unit displays a Motor Type alarm and cannot operate until a successful calibration is completed.

Initial Min Position: During a calibration routine, this value becomes the floor. This value can be adjusted from the Overview screen.

Initial Max Position: During a calibration routine, this value becomes the ceiling. This value can be adjusted from the Overview screen.

The remaining buttons correspond to steps in the Servo Calibration routine (see Section 3.2 Calibrate Servo).


Valve Settings
Purge Settings
Purge Valve Position
0.40
(.1=10%)
Metering Valve Stops Opening
1
drops
Metering Valve Closes
1
drops
Purge is called for if unit has been off for
60
minutes
Isolation Valve
Isolation Valve Alarm Limit
200
drops
Drops that have fallen since Isolation Valve closed
0
drops
Max Time Open (Batch Mode)
5
minutes
Batch Settings
Min Metering Valve Position
0.10
(.1=10%)
Max Metering Valve Position
0.40
(.1=10%)
Time to wait for drops before switch between positions
20.0
seconds
© 2011 Sentry Equipment Corp.
Revision T2.01

4.4.3 Valve Settings Screen

Purge Settings

Purge Valve Position: The maximum position the metering valve is allowed to open during a purge cycle.

Metering Valve Stops Opening: During a purge cycle, the number of drops which must fall before the metering valve stops opening.

Metering Valve Closes: During a purge cycle, the number of drops after which the metering valve closes.

Purge is called for if unit has been off for: The amount of time (in minutes) the unit can be off before requiring a purge cycle on restart.

Isolation Valve

Isolation Valve Alarm Limit: The number of drops allowed to fall after the isolation valve closes. Drops in excess of this number trigger an isolation valve alarm.

Drops that have fallen since Isolation Valve closed: Actual number of drops that have fallen since the isolation valve closed.

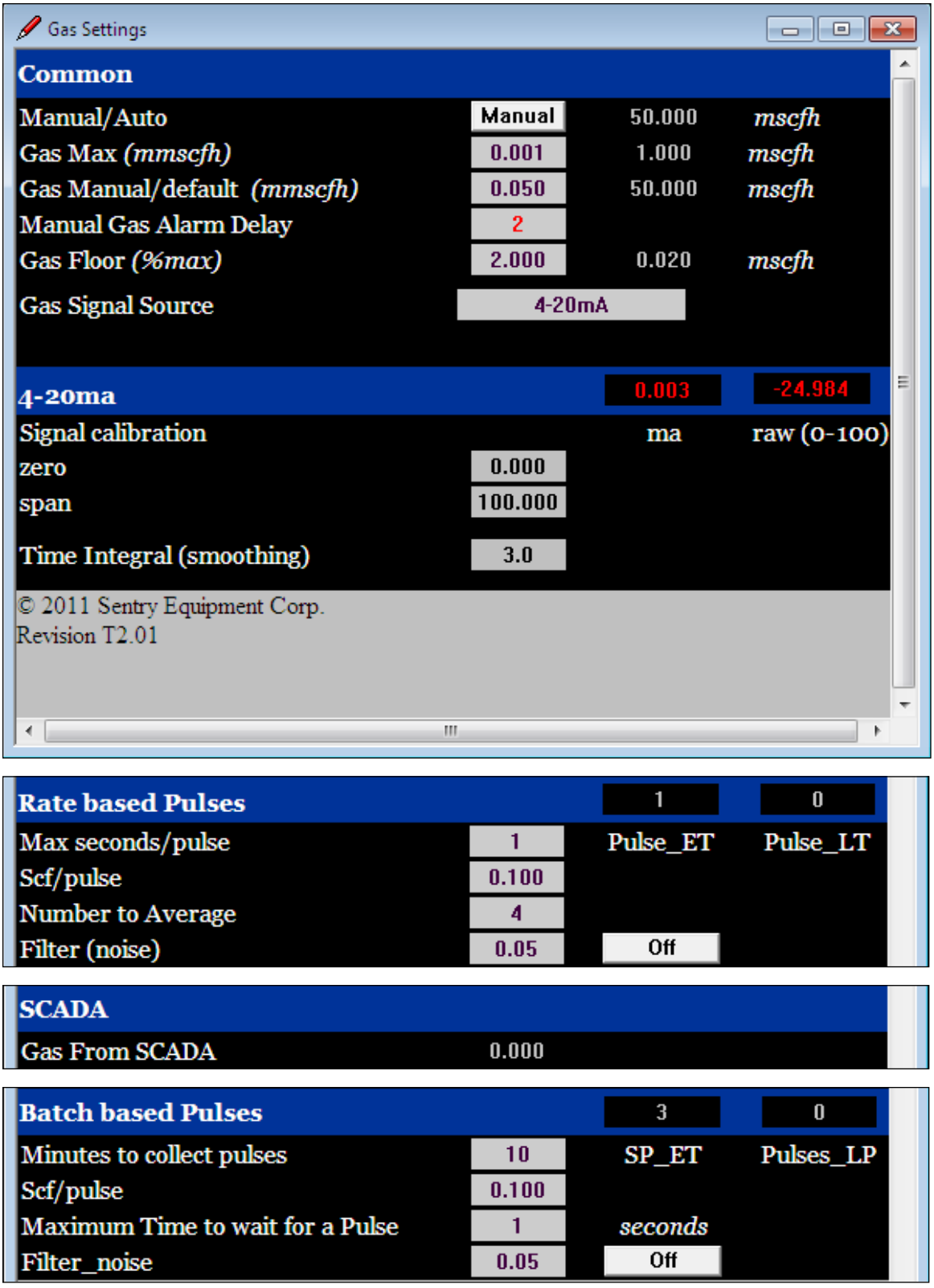
Max Time Open (Batch Mode): The maximum amount of time (in minutes) that the isolation valve can be open during a batch delivery. After this time has elapsed, the valve closes and reopens, forcing a new odorant injection rate calculation.

Batch Settings

Min Metering Valve Position: This is the initial position for the metering valve during a batch cycle. If no drops occur within a given time frame, the valve moves to the Maximum Valve Position.

Max Metering Valve Position: This is the maximum position the valve moves to during a batch cycle.

Time to wait for drops before switch between positions: The amount of time (in seconds) that the valve waits for a drop at either the min or max position before it moves to the next position.


Gas Settings
Common
Manual/Auto
Manual
50.000
mscfh
Gas Max (mmscfh)
0.001
1.000
mscfh
Gas Manual/default (mmscfh)
0.050
50.000
mscfh
Manual Gas Alarm Delay
2
Gas Floor (%max)
2.000
0.020
mscfh
Gas Signal Source
4-20mA
4-20ma
0.003
-24.984
Signal calibration
ma
raw (0-100)
zero
0.000
span
100.000
Time Integral (smoothing)
3.0
© 2011 Sentry Equipment Corp.
Revision T2.01
Rate based Pulses
1
0
Max seconds/pulse
1
Pulse_ET
Pulse_LT
Scf/pulse
0.100
Number to Average
4
Filter (noise)
0.05
Off
SCADA
Gas From SCADA
0.000
Batch based Pulses
3
0
Minutes to collect pulses
10
SP_ET
Pulses_LP
Scf/pulse
0.100
Maximum Time to wait for a Pulse
1
seconds
Filter_noise
0.05
Off

4.4.4 Gas Settings Screen

Common

Manual/Auto: Toggle to select Manual or Auto Gas Flow Mode. If Manual is selected, the value chosen for Gas Manual/default is used. If Auto is selected, the Gas Signal Source selected is used to track flow.

Gas Max (mmscfh): The maximum flow rate for the site.

Gas Manual/default (mmscfh): Desired hourly flow rate when using Manual mode.

Manual Gas Alarm Delay: Time (in hours) that the unit may be in Manual mode before the Manual Gas Alarm is triggered.

Gas Floor (% Max): Lower limit flow rate for the site. This value is a percentage of the Gas Max. When the flow rate drops below this point, the unit shuts off.

Signal Source: Source used to determine flow rate. Select source type from dropdown list.

Source Types

4-20 ma

Used when the site has a 4-20 ma signal to determine flow rate.

Signal Calibration: Measured analog input

Zero: This value allows you to adjust the 4 mA signal to be a clean zero gas flow.

Span: This value allows you to adjust the 20 mA signal to be a clean 100% gas flow.

Time Integral (smoothing): Analog input is integrated over this many seconds.

Rate based Pulses

Used when the site uses individual pulses to determine the flow rate.

Max seconds/pulse: Total number of seconds to wait for a pulse before declaring zero gas flow.

Scf/pulse: How much a pulse is equal to in standard cubic feet.

Number to Average: The gas flow rate is a running average of this many readings.

Filter(noise): Eliminates noise by filtering out signals where the time between pulses is less than this number of seconds.

SCADA

See Appendix

PULSES_BATCH

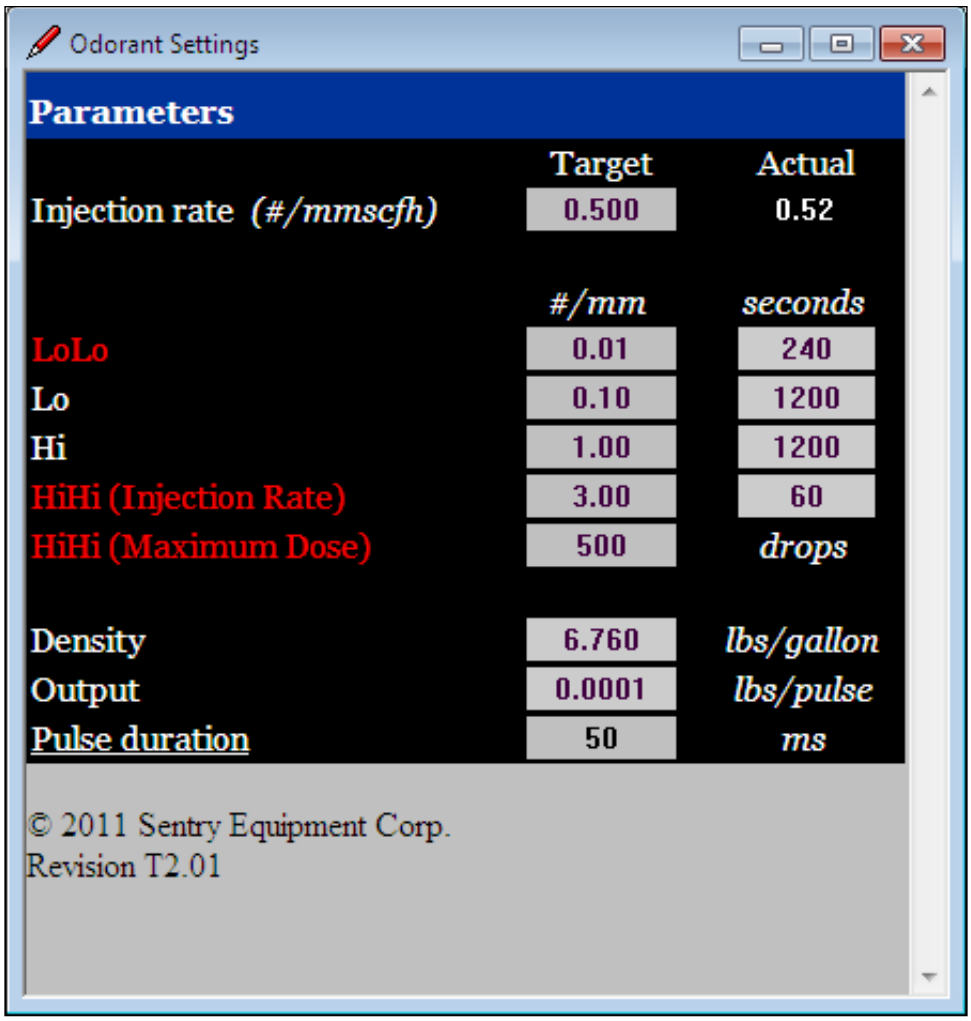
Used when the site uses a batch of pulses to determine the flow rate.

Minutes to collect pulses: Total time (in minutes) the unit collects pulses before calculating gas flow.

Scf/pulse: How much a pulse is equal to in standard cubic feet.

Maximum Time to wait for a Pulse: Time (in seconds) to wait for a pulse before declaring zero gas flow

Filter_noise: Eliminates noise by filtering out signals where the time between pulses is less than this number of seconds.


Odorant Settings
Parameters
Target
Actual
Injection rate (#/mmscfh)
0.500
0.52
#/mm
seconds
LoLo
0.01
240
Lo
0.10
1200
Hi
1.00
1200
HiHi (Injection Rate)
3.00
60
HiHi (Maximum Dose)
500
drops
Density
6.760
lbs/gallon
Output
0.0001
lbs/pulse
Pulse duration
50
ms
© 2011 Sentry Equipment Corp.
Revision T2.01

4.4.5 Odorant Settings Screen

Parameters

Injection Rate (#/mmschf):

- *Target:* Desired injection rate.
- *Actual:* Actual injection rate for the unit.

LoLo: Injection rate (in #/mm) at which the unit goes into a LoLo alarm and shuts off, and the amount of time (in seconds) the unit is allowed to be in that state before declaring an alarm..

Lo: Settings for Lo alarms

Hi: Settings for Hi alarms

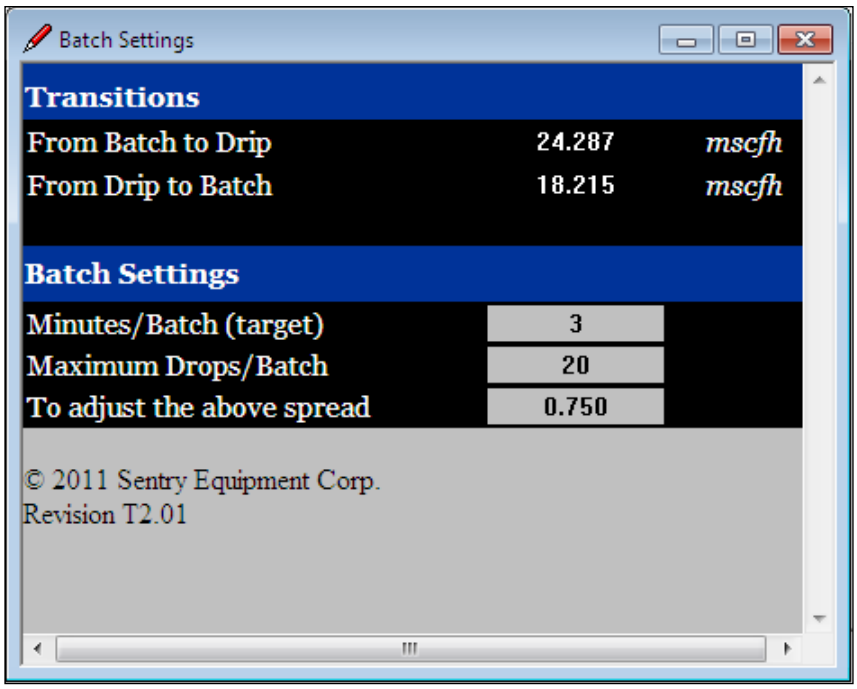
HiHi (Injection Rate): Alarm settings as they pertain to injection rate (in #/mm) and time (in seconds).

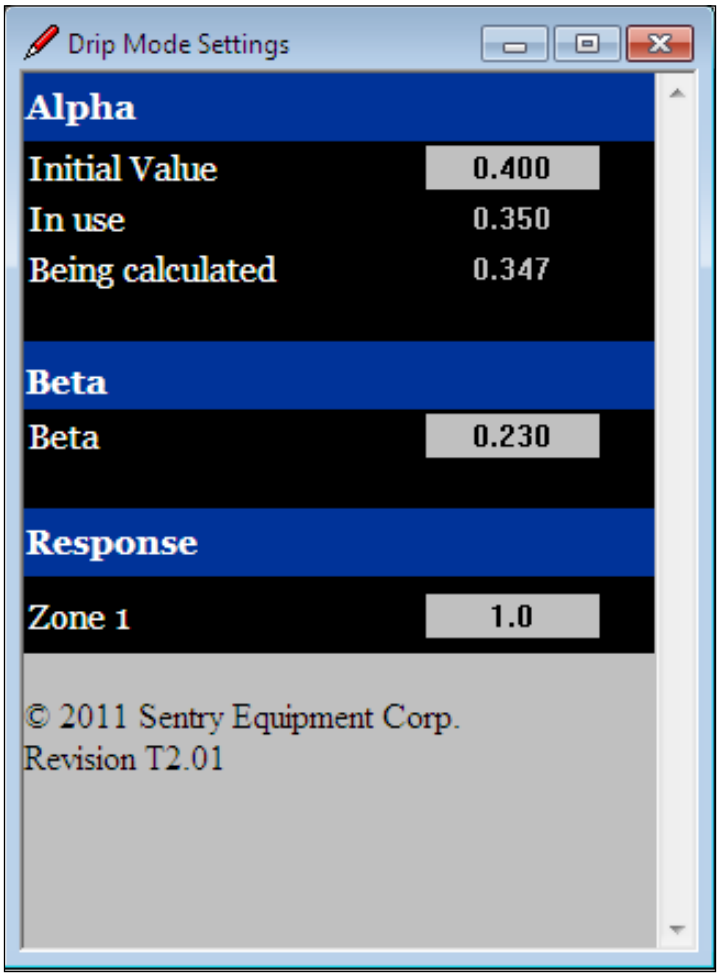
HiHi (Maximum Dose): Maximum number of drops that the unit can deliver after the isolation valve has closed in batch mode.

Density: Odorant weight in pounds per gallon.

Output: Amount of odorant in pounds per pulse

Pulse Duration: Amount of time a pulse is equal to in milliseconds


Batch Settings
Transitions
From Batch to Drip
24.287
mscfh
From Drip to Batch
18.215
mscfh
Batch Settings
Minutes/Batch (target)
3
Maximum Drops/Batch
20
To adjust the above spread
0.750
© 2011 Sentry Equipment Corp.
Revision T2.01


Drip Mode Settings
Alpha
Initial Value
0.400
In use
0.350
Being calculated
0.347
Beta
Beta
0.230
Response
Zone 1
1.0
© 2011 Sentry Equipment Corp.
Revision T2.01

4.4.6 Batch Settings Screen

Transitions

The transitions are calculated values based on the Batch Settings.

From Batch to Drip: The flow rate (in mscfh) at which the unit switches from batch mode to drip mode.

From Drip to Batch: The flow rate (in mscfh) at which the unit switches from drip mode to batch mode.

Batch Settings

Minutes/Batch (target): Target time (in minutes) in which the unit completes a batch cycle.

Maximum Drops/Batch: The maximum number of drops that are allowed in Batch Mode. Changing this number changes the flow rates at which the unit goes into and out of a batch cycle.

To adjust the above spread: Deadband for calculated transitions

4.4.7 Drip Mode Settings Screen

Alpha

Initial Value: Initial alpha setting for the valve.

In Use: Current alpha of the unit.

Being Calculated: The next alpha for the unit.

Beta

Beta: The beta setting affects the alpha settings.

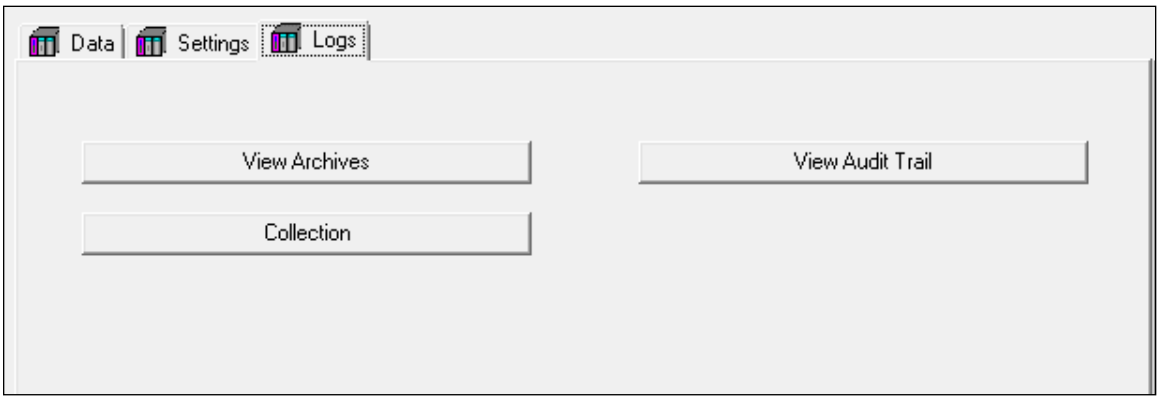
Response

Zone 1: The zone in which data is collected by the unit. The data is then used to make valve adjustments in order to reach the target injection rate.

> **➲ Note:**
> *The alpha and beta settings should not be adjusted without consulting Sentry Equipment Corp.*

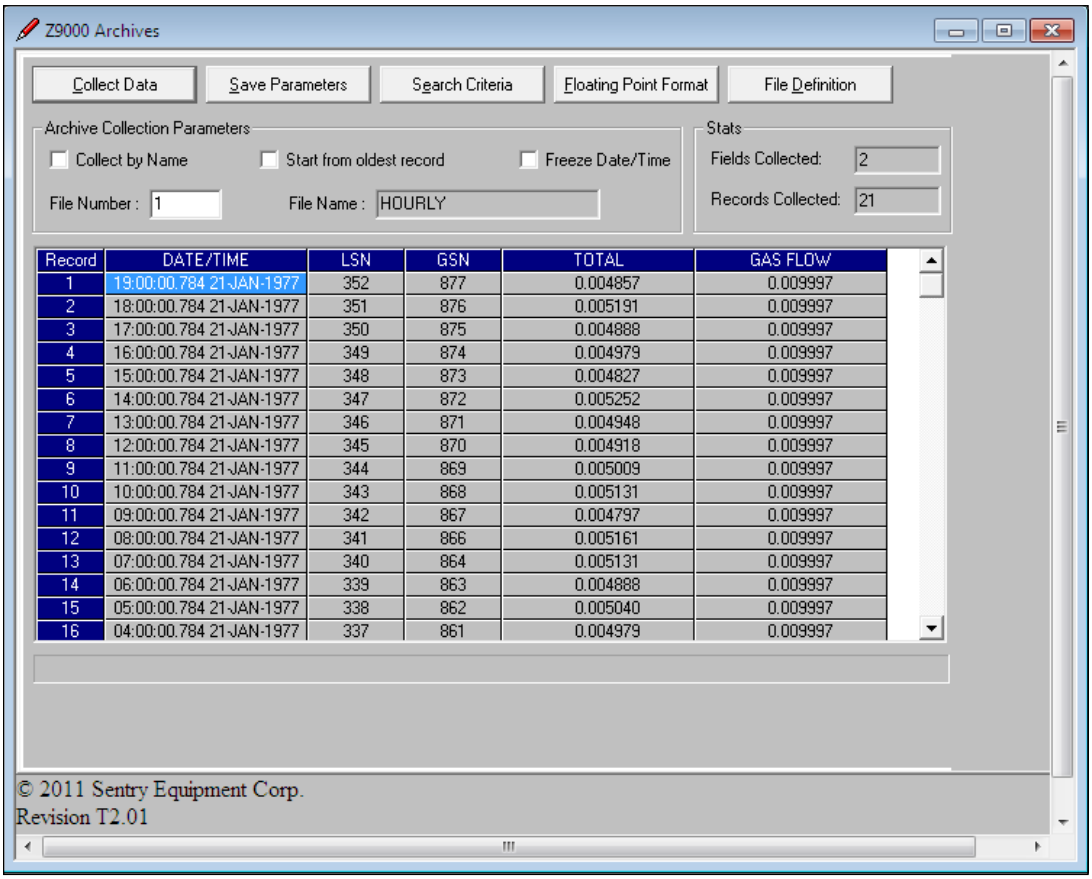
4.5 Z9000: Logs

The Logs tab gives the user access to the View Archives, Collection, and View Audit Trail screens.



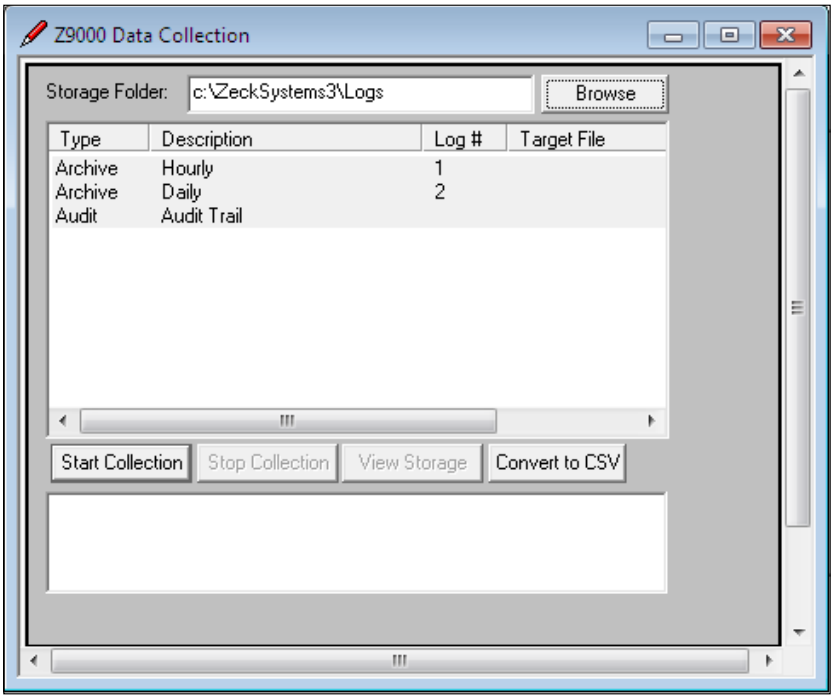
4.5.1 Z9000 Archives Screen

The Archives screen automatically loads the archives into the screen for viewing, but does not collect and store the archives to the computer.



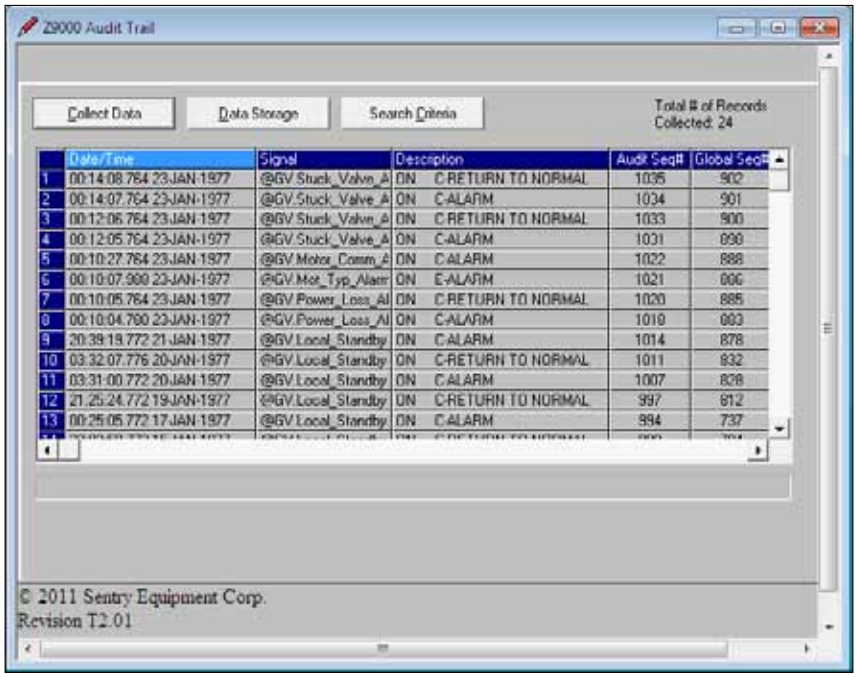
4.5.2 Z9000 Data Collection Screen

On the Collection screen, clicking the "Start Collection" button downloads and stores the archives into the folder indicated in the "Storage Folder" field. Clicking the "Convert to CSV" button translates the files into CSV format for viewing with Excel.

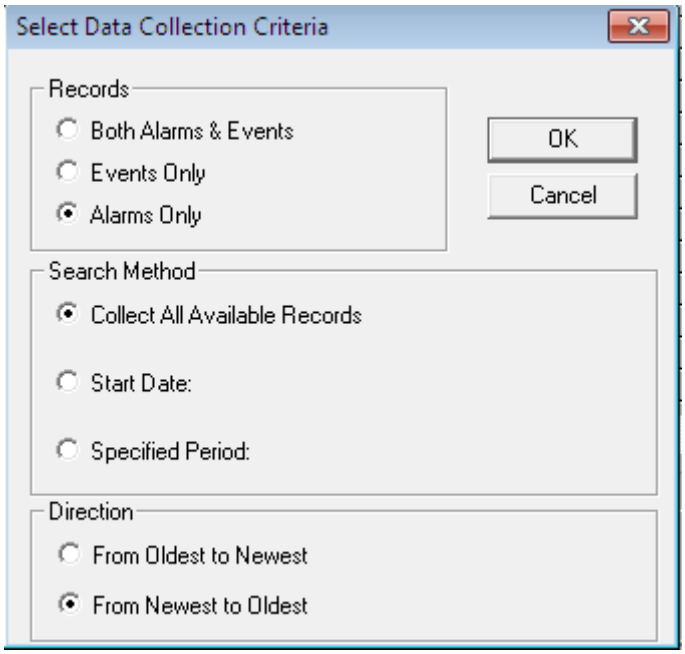


4.5.3 Z9000 Audit Trail Screen

The Audit Trail screen automatically displays logged alarms.

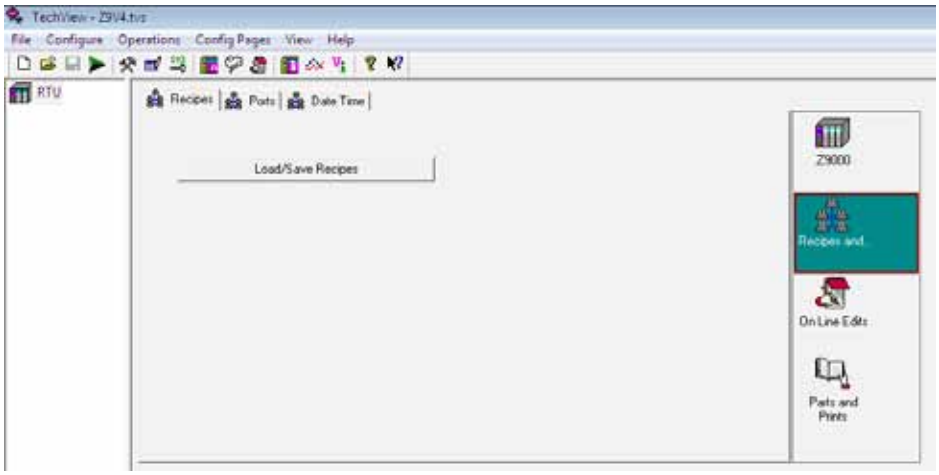


Clicking the “Search Criteria” button brings up the Select Data Collection Criteria dialog. Under Records, choose “Both Alarms & Events” to display configuration settings that have changed, as well as alarms and other information that can be helpful in troubleshooting the root cause of a problem.



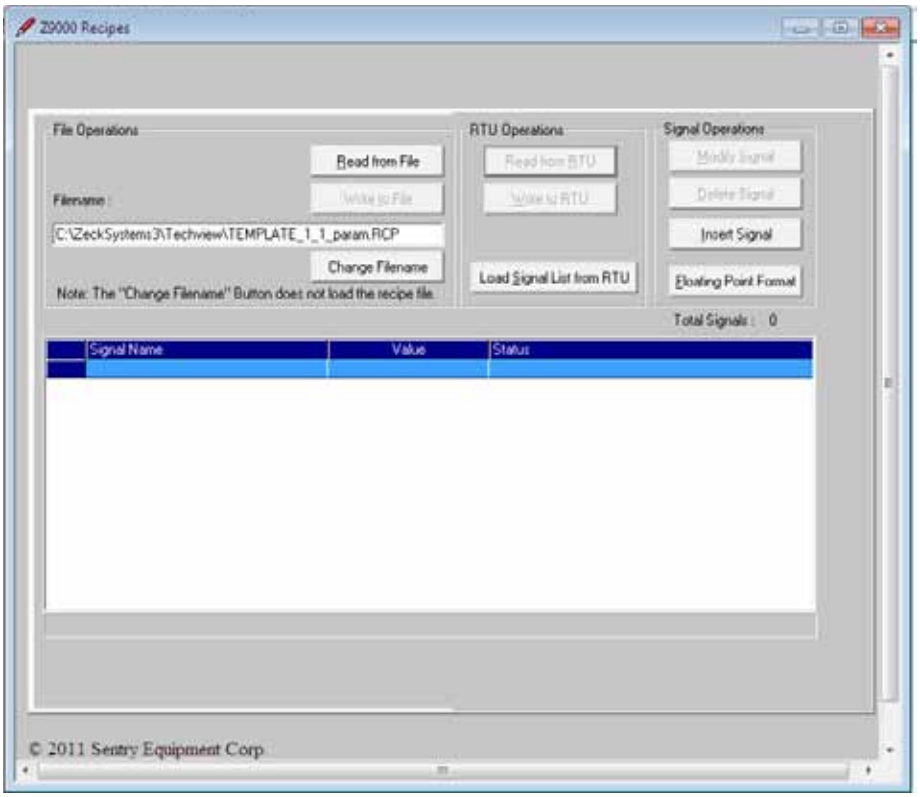
4.6 Recipes and Ports: Recipes

The Recipes and Ports Group gives the user access to the Recipes, Ports, and Date Time tabs. The Recipes tab allows access to the Z9000 Recipes screen.



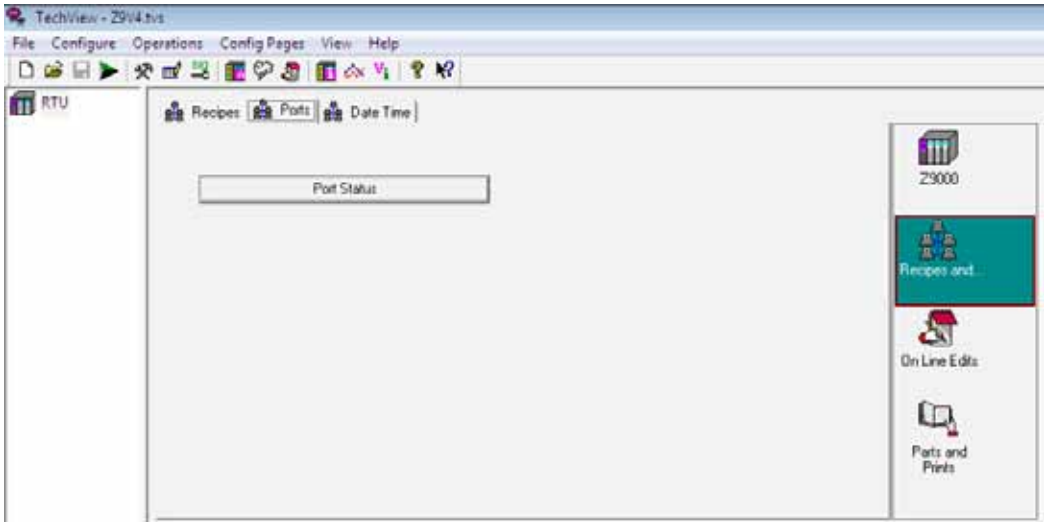
4.6.1 Z9000 Recipes

Clicking Load/Save Recipes opens the Z9000 Recipes screen.



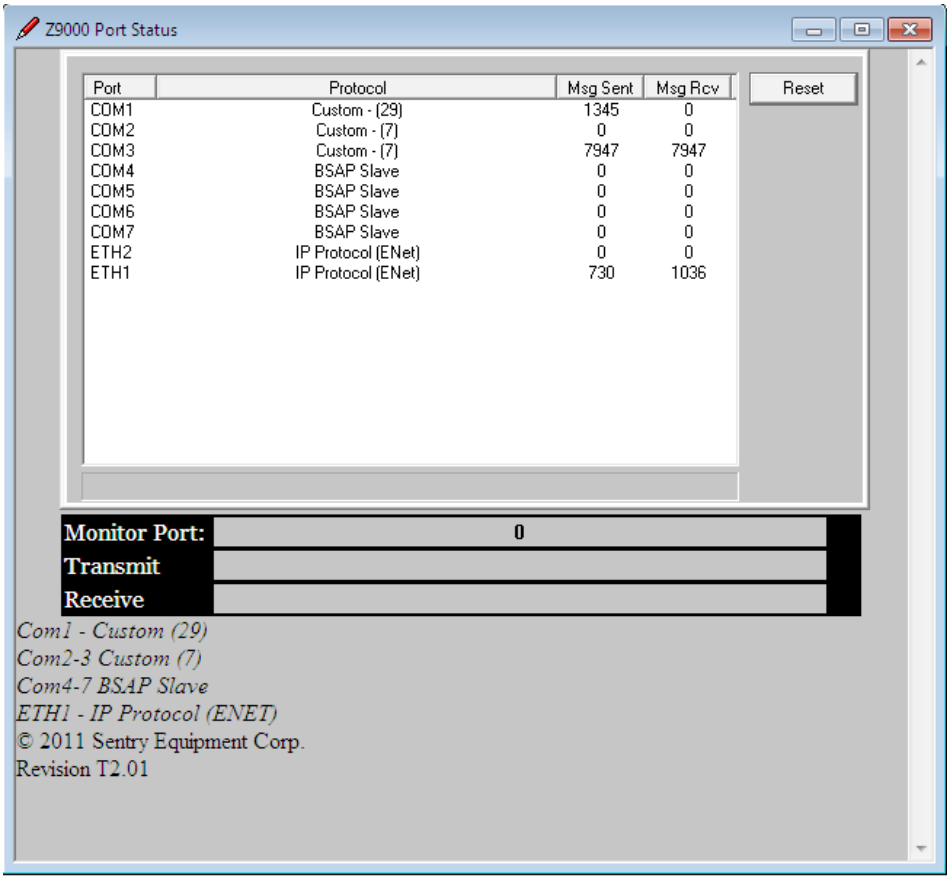
4.7 Recipes and Ports: Ports

The Ports tab allows the user to access the Port Status screen.



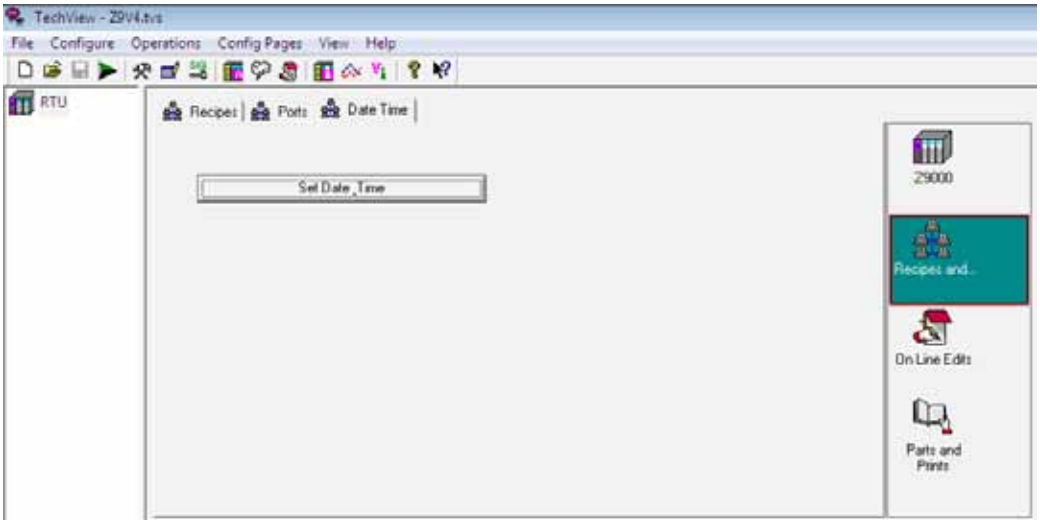
4.7.1 Z9000 Port Status Screen

On the Port Status screen, click in the "Monitor Port" field and enter the port number you wish to view activity on. The "Transmit" and "Receive" fields display incoming and outgoing traffic on that port.



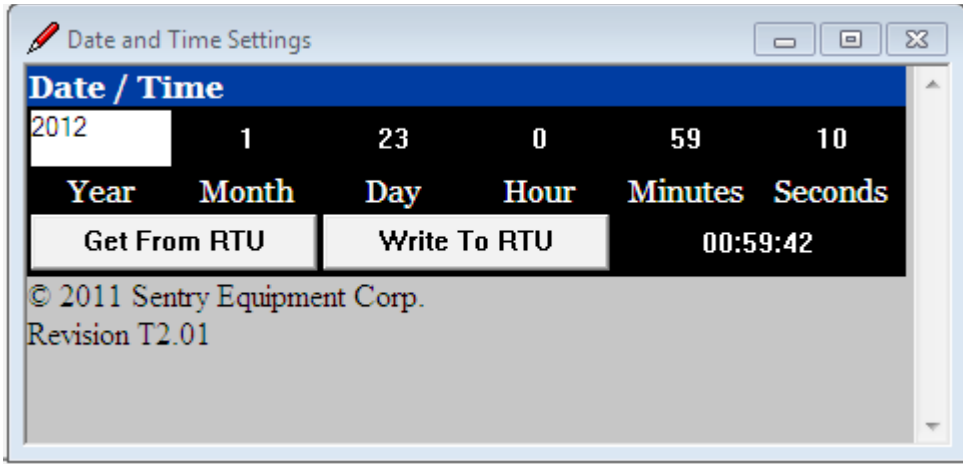
4.8 Recipes and Ports: Date Time

The Date Time tab allows the user to access the Date and Time Settings screen.



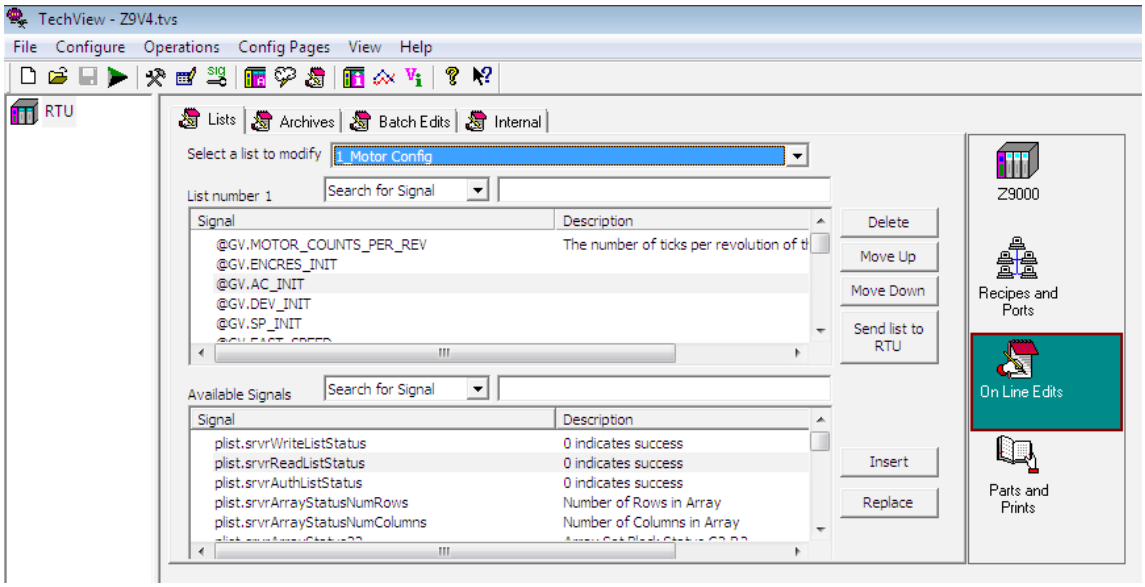
4.8.1 Date and Time Settings Screen

Each field on the Date and Time Settings screen can be clicked on and modified. The RTU is not updated until the "Write to RTU" button is clicked. "Get from RTU" populates the fields with the current date/time.



4.9 On Line Edits

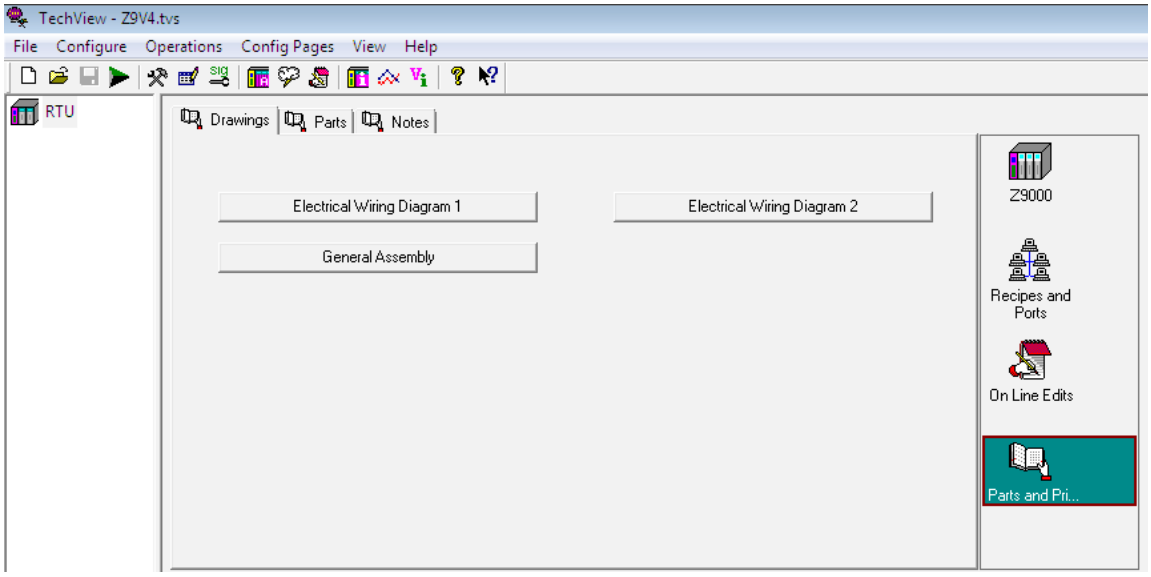
The On Line Edits Group should not be used without first consulting Sentry Equipment Corp.



4.10 Parts and Prints: Drawings

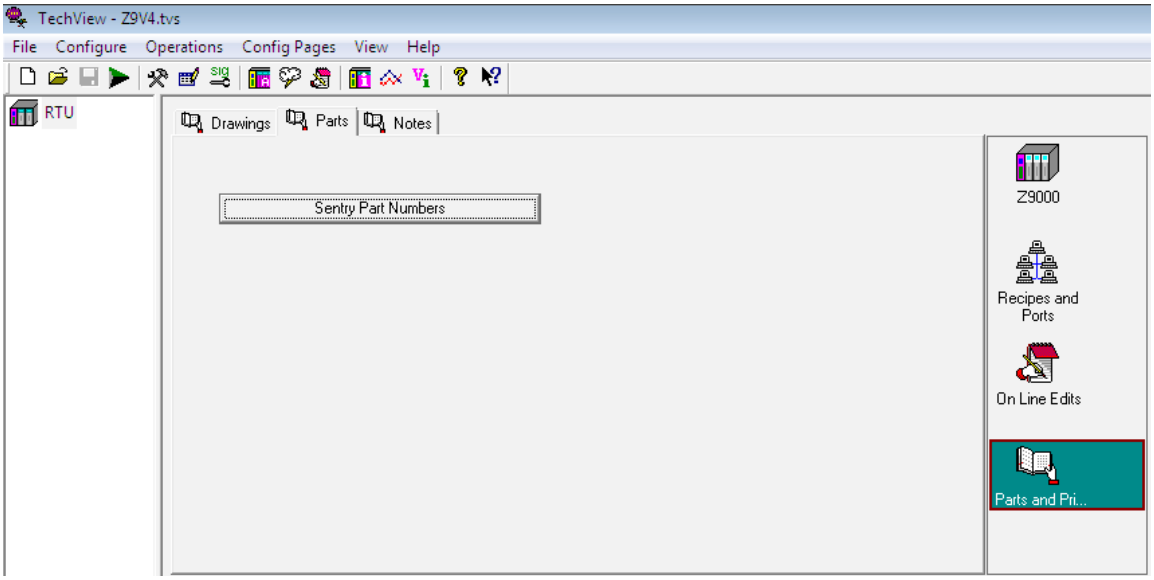
The Parts and Prints Group gives the user access to the Drawings, Parts, and Notes tabs.

The Drawings tab allows the user to access the Electrical Wiring Diagrams and General Assembly drawings for the Z9000.



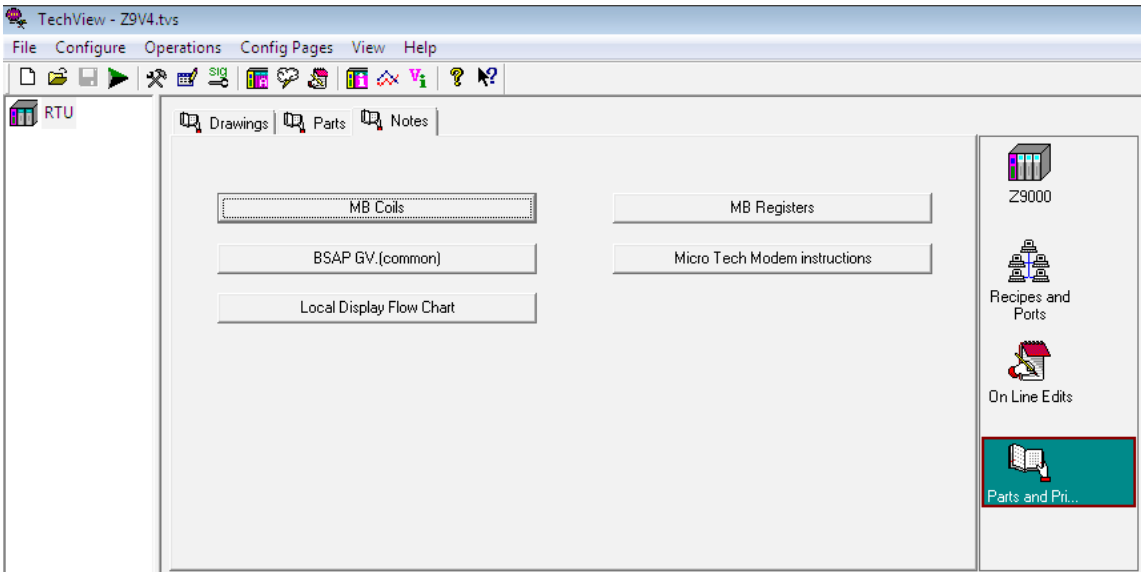
4.11 Parts and Prints: Parts

The Parts tab allows the user to access a list of Sentry Part Numbers for the Z9000.



4.12 Parts and Prints: Notes

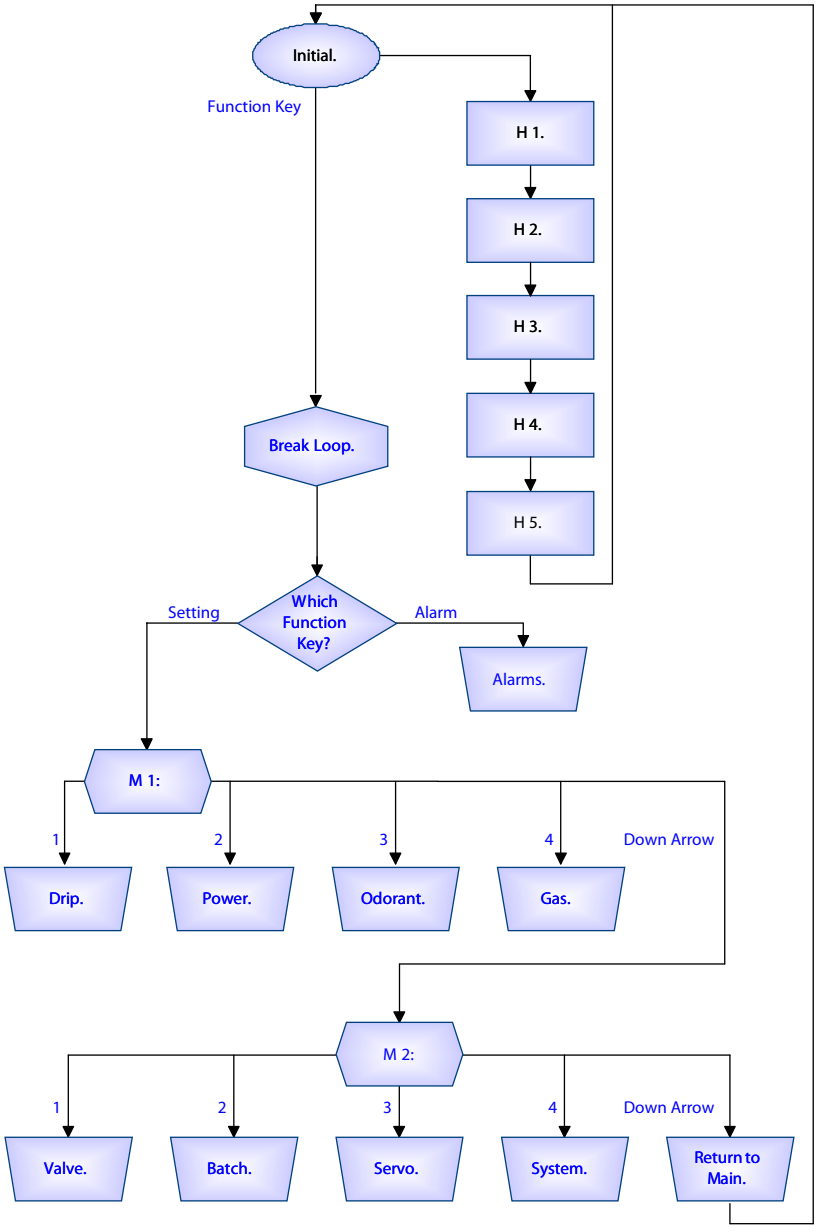
The Notes tab allows the user to access various information



5. Local Display Firmware

The flowchart below illustrates the relationships between the various screens of the local display.

- The Home screens (H1-H5) are a continuous loop.
- The Setting and Alarm function keys break this loop and allow access to the other screens.



5.1 Navigating the Local Display

Use the keypad below the screen for navigation.

- The page up (6) and page down (7) keys allow the operator to move between screens.
- The cursor up (4) and cursor down (5) keys allow the operator to navigate within certain screens to settings that can be changed.
- The toggle (8) key is used to switch between defined values for certain settings.

5.2 Changing Settings

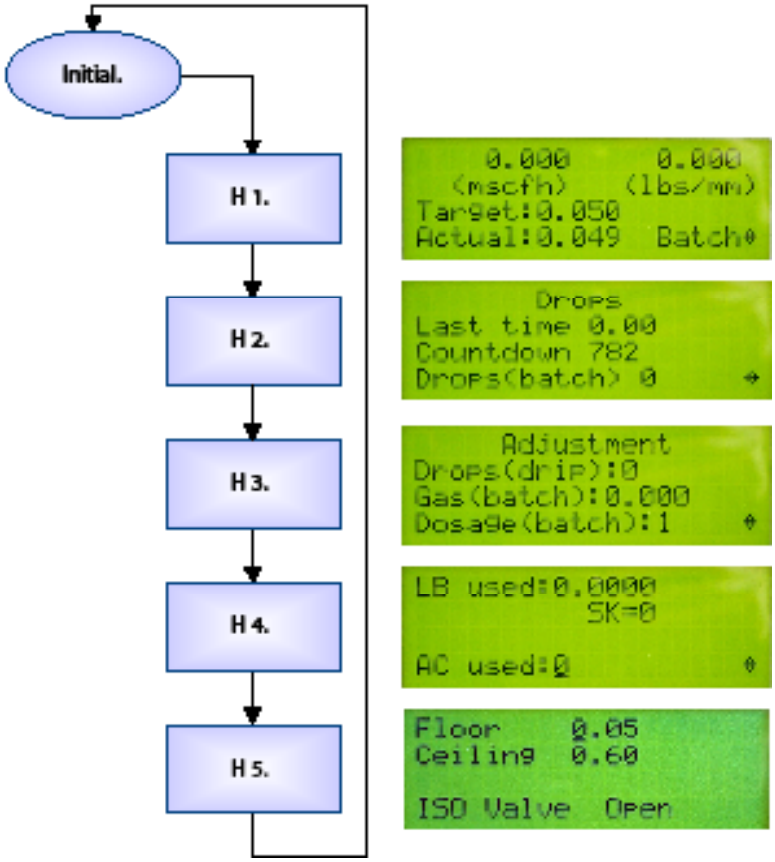
There are settings on some screens that can be changed by the operator. Settings that can be changed show a cursor under the first character of the value.

To change a setting:

1. Move the cursor to the setting.
2. Press Clear (yellow key) to delete the current value.
3. Enter the desired value using the numbered keys.
4. Press Enter to save the new value.

➲ Note:
Pressing Clear followed by Enter (without entering a new value) will cause the setting to revert to the previous saved value.

5.3 Home Screens



The Home Screens display information about the current function of the station.

H1: The main screen shows:

- Hourly flow rate for the station in mscfh
- Odorant injection rate in lbs/mm
- Target valve position
- Actual valve position
- Mode (drip or batch) in which the station is working

H2: The Drops screen shows:

- Last time: time interval between the two previous drops
- Countdown: time that has passed since the last drop fell
- Drops (batch): number of drops delivered during batch mode

H3: The Adjustment screen shows when the unit will make the next move to reach the desired injection rate.

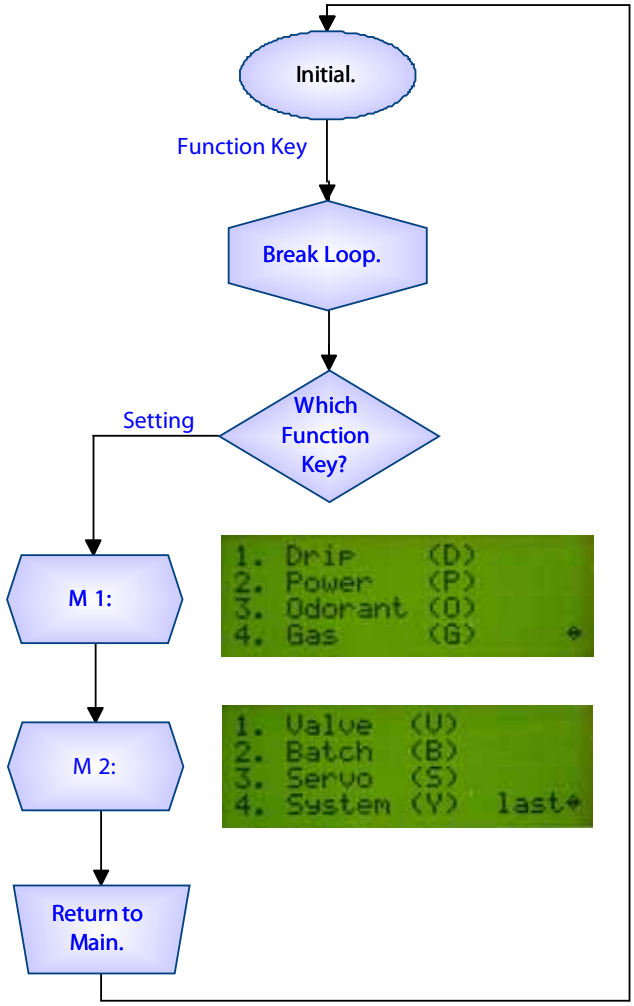
H4: The Usage screen shows:

- LB used: the amount of odorant used by the unit in pounds (this counter can be reset to 0 by pressing the soft key - SK)
- AC used: the number of auto clears used

H5: The final Home screen shows the valve floor and ceiling, and whether the isolation valve is Open or Closed.

5.4 Settings

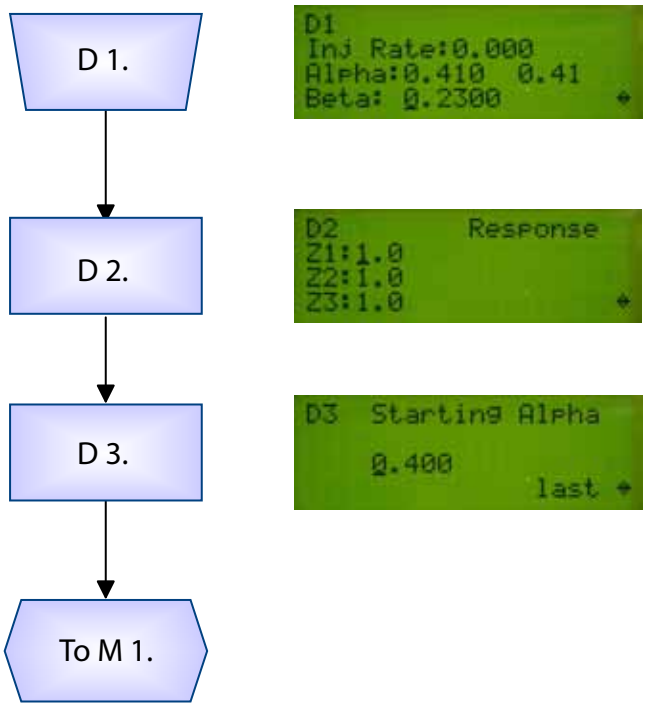
The Settings menu can be accessed at any time by pressing the blue function key labeled Setting. The Settings menu is comprised of two screens (M1 and M2).



From these menus, users can access the desired screens by pressing the corresponding number. For example, from M1, press 3 to access the Odorant screens; from M2, press 3 to access the Servo screens.

5.4.1 Drip Settings

From M1, press 1 to access the Drip screens.



D1: This screen shows the injection rate of the unit, and the alpha and beta positions.

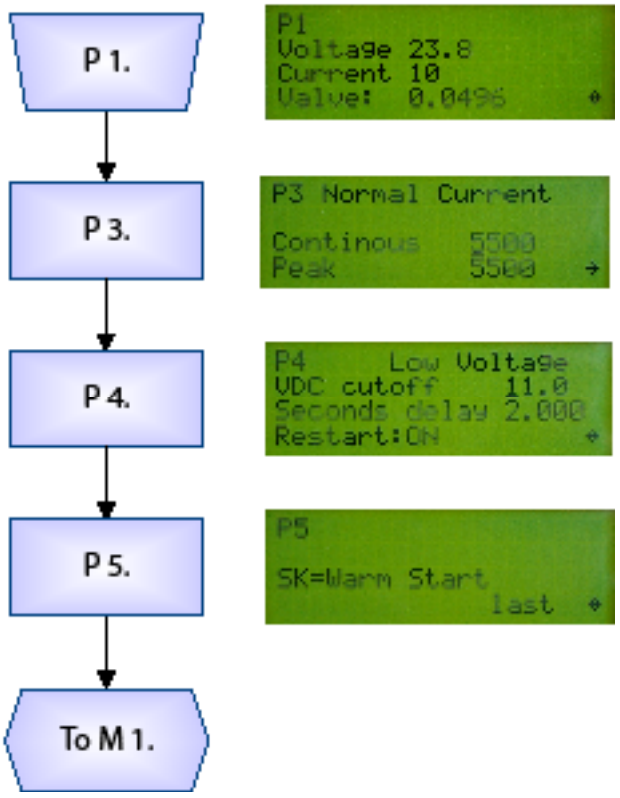
D2: The Response screen shows the zones in which data is collected by the unit. This data is used to make valve adjustments in order to reach the target injection rate.

D3: The Starting Alpha screen shows the starting valve position.

➲ Note:
The alpha and beta settings should not be adjusted without consulting Sentry Equipment Corp.

5.4.2 Power Settings

From M1, press 2 to access the Power screens.



P1: The main Power screen shows the supplied voltage, the current being used, and the actual valve position.

P3: The Normal Current screen shows the normal current values (spiking current levels can be set here).

- Continuous: The amount of current necessary to operate the servo under normal operations
- Peak: The maximum amount of current allowed during normal operation

P4: The Low Voltage screen shows the low voltage settings.

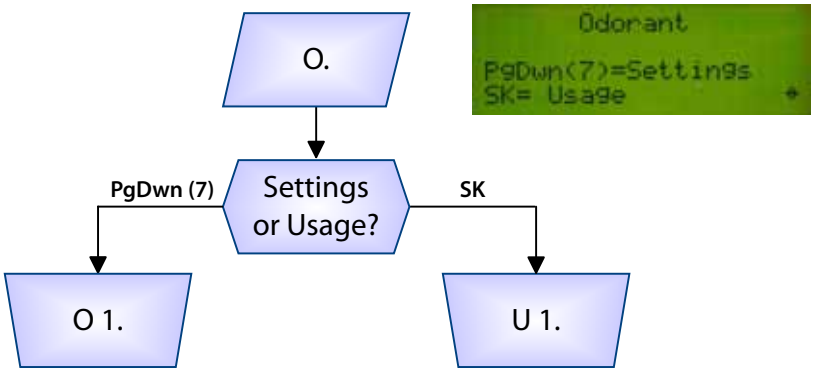
- VDC cutoff: the level at which the low voltage alarm triggers
- Seconds delay:
- Restart:

P5: From this screen press SK (soft key) to warm start the unit.

5.4.3 Odorant Menu

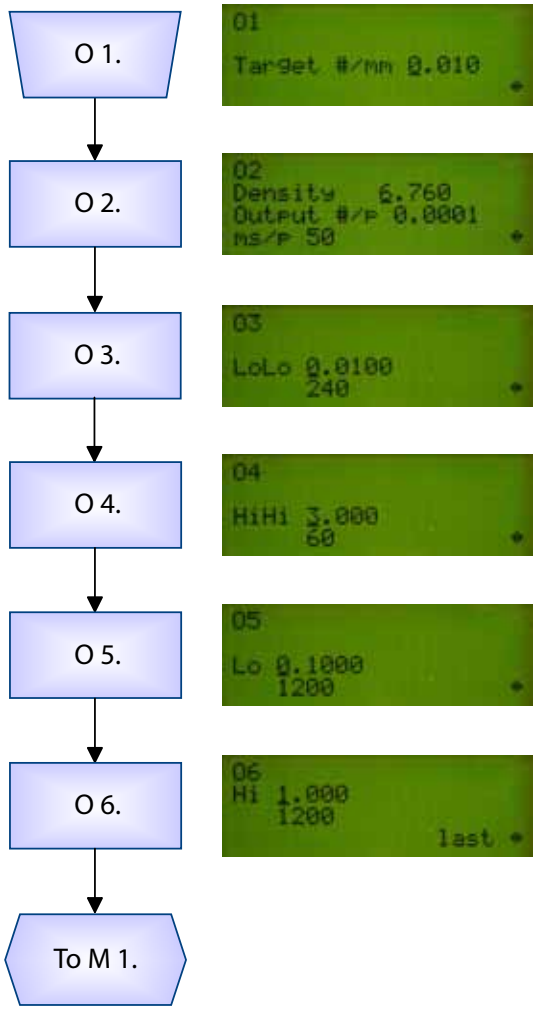
From M1, press 3 to access the Odorant menu.

From the Odorant menu, press Page Down (7) to access the Odorant Settings screens, or press SK (soft key) to access the Odorant Usage screens.



5.4.4 Odorant Settings

From M1, press 3, then page down (7) to access the Odorant Settings screens. All Odorant Setting values can be changed.



O1: Shows the target injection rate

O2: Shows the odorant density, pulse output, and pulse duration

O3: Shows the LoLo settings.

- Top value indicates minimum injection rate (in #/mm) before alarm is triggered and unit shuts off.
- Bottom value indicates maximum number of seconds unit may go without injecting odorant before alarm is triggered and unit shuts off.

O4: Shows the HiHi settings.

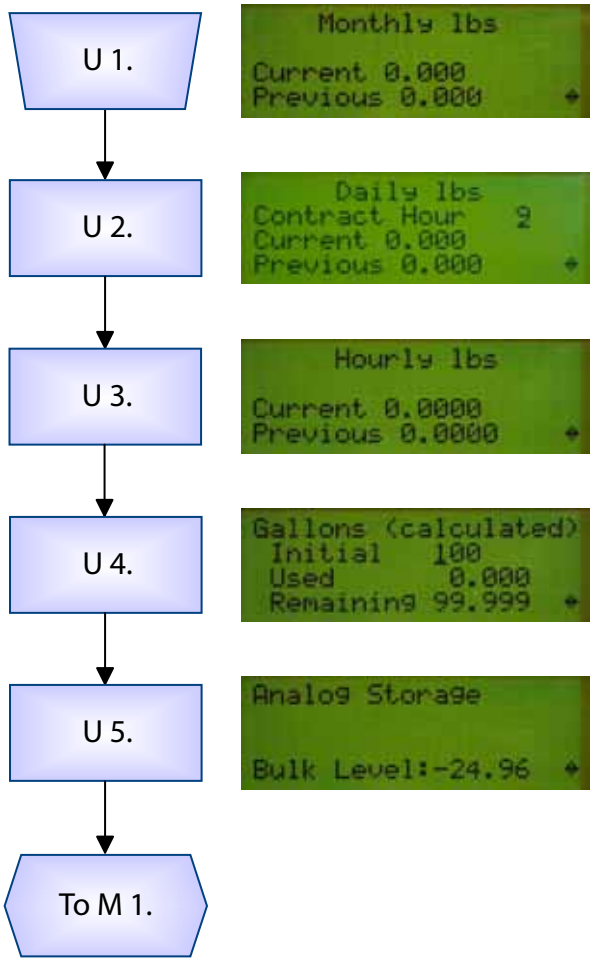
- Top value indicates maximum injection rate (in #/mm) before alarm is triggered.
- Bottom value indicates maximum number of drops that can be injected at one time before alarm is triggered.

O5: Shows the Lo settings

O6: Shows the Hi settings

5.4.5 Odorant Usage

From M1, press 3, then SK to access the Odorant Usage screens.



U1: The Monthly lbs screen shows odorant usage for the current and previous months.

U2: The Daily lbs screen shows the number of contract hours as well as the odorant usage for the current and previous days.

U3: The Hourly lbs screen shows odorant usage for the current and previous hours.

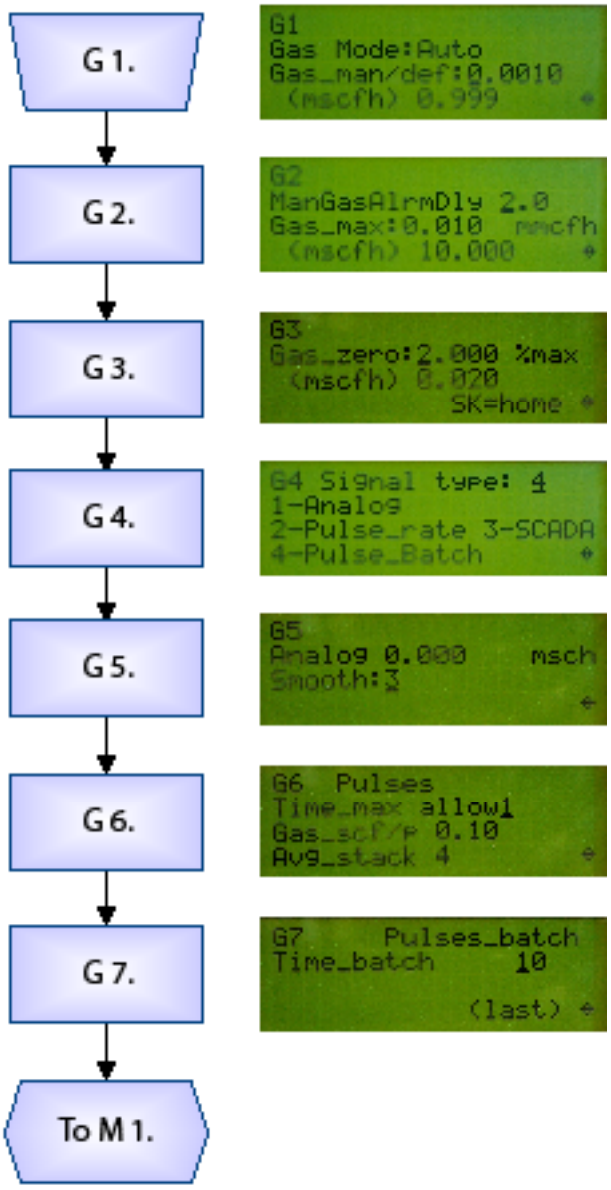
U4: The Gallons screen shows the virtual level gauge values

- Initial: the number of gallons the tank started with; this value is editable
- Used: the calculated number of gallons that have been used; this value is editable
- Remaining: the number of gallons remaining in the tank; this value is calculated and cannot be changed

U5: The Analog Storage screen shows the tank level when an analog level transmitter is used.

5.4.6 Gas Settings

From M1, press 4 to access the Gas screens.



G1: Shows the gas mode (toggle (8) to switch between Auto and Manual) and the manual/default flow rate.

G2: Shows the manual gas alarm delay and the maximum gas flow in both mmcfh and mscfh.

G3: Shows the flow rate at which the unit declares zero flow. Pressing SK returns the user to H1, the main Home screen.

G4: Shows the gas signal type

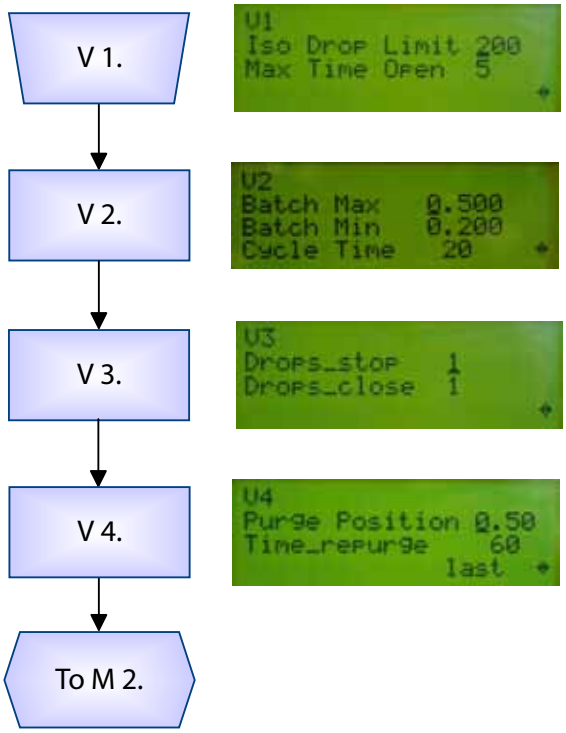
G5: Shows the settings for an analog 4-20 mA signal

G6: Shows the settings for a rate-based pulse signal.

G7: Shows the setting for a batch based pulse signal

5.4.7 Valve Settings

From M2, press 1 to access the Valve screens.



V1: Shows the number of drops allowed to fall after the isolation valve closes (Iso Drop Limit) and the maximum amount of time (in minutes) that the isolation valve can be open during a batch delivery (Max Time Open).

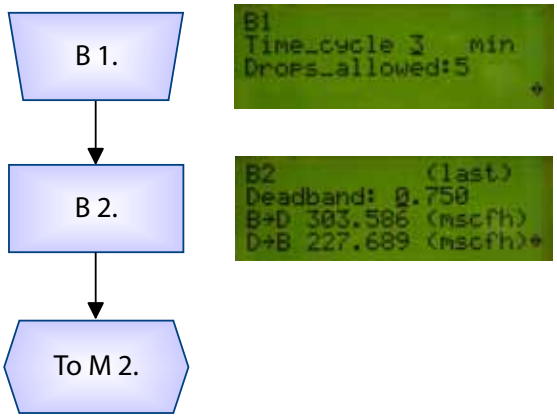
V2: Shows the maximum and minimum valve positions during a batch cycle and the time the valve stays open at each position.

V3: Shows the number of drops required in a purge and the number of drops allowed to fall after isolation shutoff.

V4: Shows the maximum position the metering valve is allowed to open during a purge cycle (Purge Position) and the amount of time the unit must be off in order to purge on restart (Time_repurge).

5.4.8 Batch Settings

From M2, press 2 to access the Batch screens.

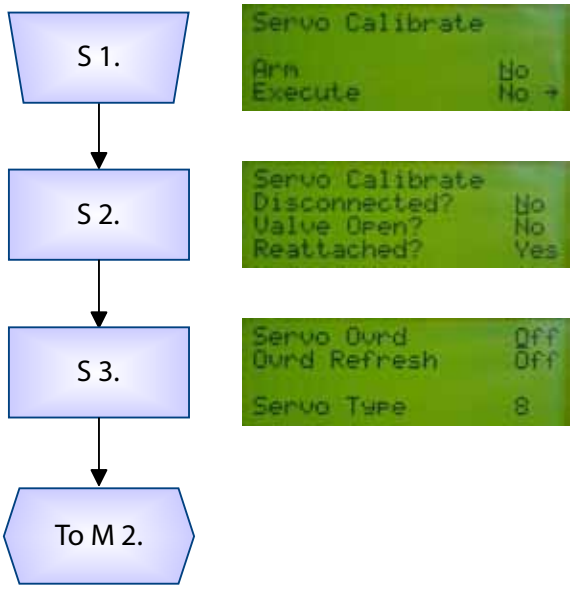


B1: Shows the desired batch cycle time and the drops allowed in the cycle

B2: Shows the deadband and the flow rates at which the unit switches from batch to drip and drip to batch

5.4.9 Servo Settings

From M2, press 3 to access the Servo screens.



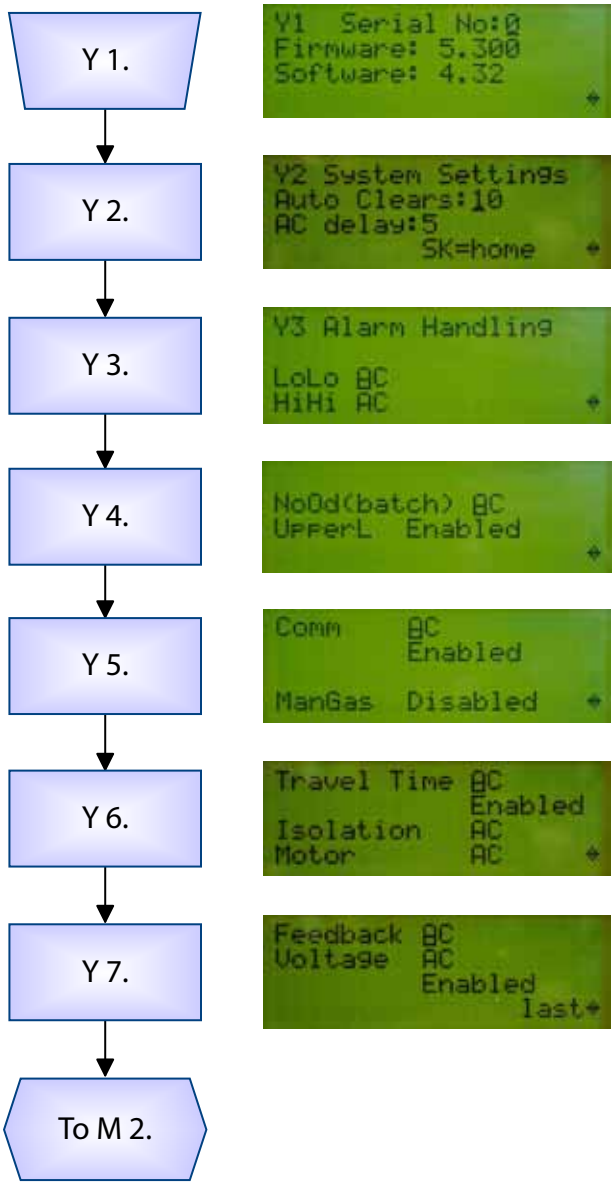
S1 & S2: Sequential steps in the Servo Calibration routine

S3: Manual Override settings

- *Servo Ovrd:* Toggle (8) this setting ON to disable the servo alarm to allow continued odorization in the event of a servo failure. The Z9000 generates a daily alarm to remind the operator not to leave the unit in this condition long term.
- *Ovrd Refresh:* Toggle (8) this setting ON to clear the daily override alarm.

5.4.10 System Settings

From M2, press 4 to access the System screens.



Y1: The first System screen shows the serial number of the unit and the firmware and software version installed on the unit.

Y2: The System Settings screen shows the number of auto clears allowed, and the delay when an auto clear is used. Pressing SK returns the user to the Home screen (H1).

Y3: Alarm Handling settings:

- LoLo: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx)
- HiHi: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx)

Y4: Alarm Handling settings

- NoOd(batch): toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the No Odorant alarm during batch cycle
- UpperL: toggle (8) to show that the upper voltage limit alarm is Enabled or Disabled

Y5: Alarm Handling settings

- Comm: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the communication alarm; on the second line, toggle (8) to indicate whether the communication alarm is Enabled or Disabled
- Man/Gas: toggle (8) to indicate whether the gas flow rate is in manual or auto mode.

Y6: Alarm Handling settings

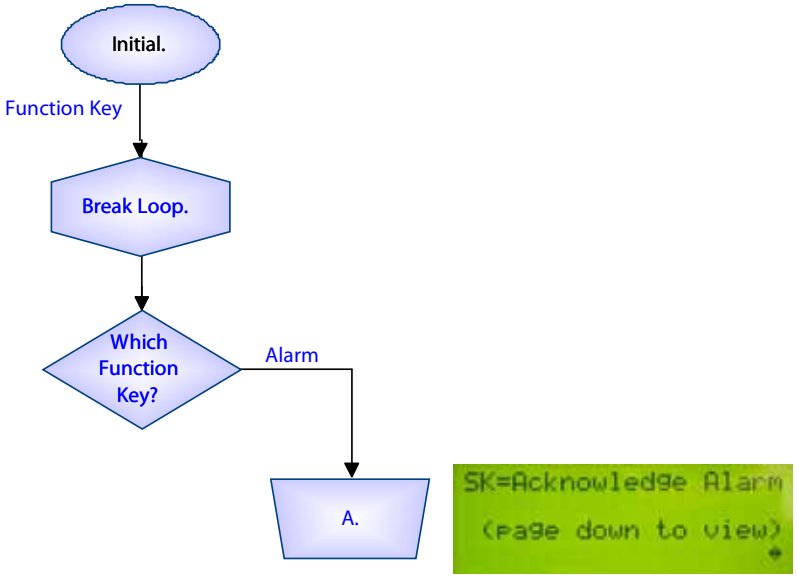
- Travel Time: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the travel time alarm; on the second line, toggle (8) to indicate whether the travel time alarm is Enabled or Disabled
- Isolation: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the isolation alarm
- Motor: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the motor alarm

Y7: Alarm Handling settings

- Feedback: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the feedback alarm
- Voltage: toggle (8) to allow auto clears (AC) or disallow auto clears (ACx) for the voltage alarm; on the second line, toggle (8) to indicate whether the voltage alarm is Enabled or Disabled

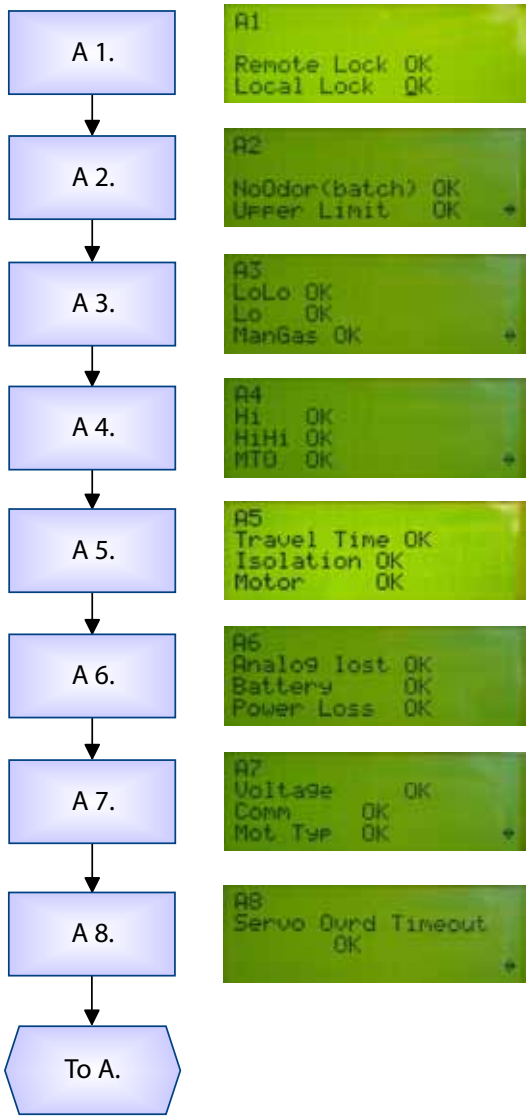
5.5 Alarm

The Alarm screens can be accessed at any time by pressing the red function key labeled Alarm.



A: The main alarm screen

- Press SK to acknowledge alarms
- Press page down (7) to view alarm screens



Each alarm status can be toggled (8) between Alarm and OK.

A1: Shows the status of the Remote Lock and Local Lock alarms

A2: Shows the status of the No Odorant and Upper Limit alarms

A3: Shows the status of the LoLo, Lo, and Manual Gas alarms

A4: Shows the status of the Hi, HiHi, and Max Time Open (MTO) alarms

A5: Shows the status of the Travel Time, Isolation, and Motor alarms

A6: Shows the status of the Analog lost, Battery, and Power Loss alarms

A7: Shows the status of the Voltage, Communication, and Motor Type alarms

A8: Shows the status of the Servo Override Timeout alarm.

6. Troubleshooting

Alarm	Issue	Action
Red light on unit is solid	Unit is off	Check for alarms, acknowledge them, and restart the unit.
Red light on unit is flashing	Unit is currently in an alarm	Check for alarms and acknowledge them.
Analog lost	4-20 mA flow signal has fallen below 4 mA	Check for voltage on pin 7 (+) and pin 3 (-) on TB2 of Mixed IO card. Check to verify source is supplying analog signal.
Battery	Battery on RTU is dead	Replace battery. Ensure recipe has been saved from unit first, as the configuration is lost when power is cut.
Communication/ Comm	No communication between RTU and servo	1. Check for send and receive lights on the CPU card. 2. If lights are not on, cut power to the unit, disconnect and reconnect the servo, and turn the power back on. 3. If there is still no communication with the servo, remove it and send it to Sentry Equipment Corp for testing.
Hi	High injection rate or too many drops falling	1. Check to see if the unit alarmed due to high injection rate or due to too many drops falling. 2. Clear the alarm and restart the unit. 3. Make any necessary adjustments to the Hi alarm settings or the valve settings.
HiHi	High injection rate or too many drops falling	1. Check to see if the unit alarmed due to high injection rate or due to too many drops falling. 2. Clear the alarm and restart the unit. 3. Make any necessary adjustments to the HiHi alarm settings or the valve settings.
Isolation	Valve closed but too many drops continue to fall	Adjust the Batch Min Valve setting to close the valve more. Clear the alarm and restart the unit.
Lo	Low injection rate or too much time between drops	1. Check to see if the unit went into alarm due to injection rate or time. 2. Clear the alarm and restart the unit. 3. Change the Lo settings or the valve settings as necessary.
Lockout (remote closure)/Remote Lock	Red tag lockout	No action required
Lockout (software) / Local Lock	Red tag lockout	No action required.

Alarm	Issue	Action
LoLo	Low injection rate or too much time between drops	1. Check to see if the unit went into alarm due to injection rate or time. 2. Clear the alarm and restart the unit. 3. Change the LoLo settings or the valve settings as necessary.
Manual Gas Alarm / ManGas	Gas Mode left in Manual mode for more than the allowed number of hours	When flow signal is restored, switch from Manual to Auto.
Motor	Servo used too much current attempting to move	If the unit has a type 1 servo: 1. Remove servo. 2. Place valve at a manual zero. 3. Re-install servo. 4. Clear the alarm. If the unit has a type 2 or 3 servo: 1. Clear the alarm. 2. Calibrate the servo. 3. Restart the unit and check the power page to be sure that the current limits are not being exceeded.
Motor Type/Mot Type	New servo has been detected	Calibrate servo
MTO*	Isolation valve open longer than the maximum time allowed, indicating that the Z9000 cannot meet demand in batch mode.	Check Valve settings to make sure that the Max Metering Valve Position is high enough and/or the Time to wait for drops is not too long.
NoOdor (batch) *	No drops fell within a given time period while seeking drops in batch mode	1. Check the pressures on the unit; be sure that the blanket pressure on the odorant tank is 15 lbs over pipeline pressure and that the actuation pressure is 75-80 psi. 2. Check the level on the odorant tank. 3. Clear the alarm and restart the unit.
NoOdorant (purge)**	No drops fell within a given time period while attempting purge	1. Check the pressures on the unit; be sure that the blanket pressure on the odorant tank is 15 lbs over pipeline pressure and that the actuation pressure is 75-80 psi. 2. Check the level on the odorant tank. 3. Clear the alarm and restart the unit.
Override Timeout / Servo Ovrd Timeout	Unit left in Servo Override for more than 24 hours	Refresh override or disable servo override
Power Loss	Unit turned off due to interruption in power supply	Verify integrity of power supply.

Alarm	Issue	Action
Travel Time	Valve did not reach target position within defined time period	If the unit has a type 1 servo: 1. Remove servo. 2. Place valve at a manual zero. 3. Re-install servo. 4. Clear the alarm. If the unit has a type 2 or 3 servo: 1. Clear the alarm. 2. Calibrate the servo. 3. Restart the unit and check the power page to be sure that the current limits are not being exceeded.
UpperLimit Calculation / Upper Limit	Settings exceed functional capabilities of the unit.	Adjust Gas or Odorant Injection Rate settings, or disable alarm.
Voltage	Voltage to RTU has fallen below allowable limit	Check power source voltage.
Zero Gas Indicator**	Unit shows gas flow rate of zero	Check to make sure that active flow is not below gas floor level. Check flow source to ensure it is reporting flow correctly.

* Local display only.

** TechView software only.

7. Standard Warranty

Sentry Equipment Corp ("Seller") warrants products manufactured by it and supplied hereunder to be free from defects in workmanship and, to the extent materials are selected by Seller, to be free from defects in materials, in each case for a period as defined in the table below:

Product Line	Warranty Period
Sentry Equipment Corp and Waters EquipmentTM	Eighteen months from date of shipment or twelve months from startup (whichever occurs first)
Odorizers	Three years from date of shipment
Odorizer Bellows Pump Module	Ten years from date of shipment

If within such period any such products shall be proved to Seller's satisfaction to be defective, such products shall be repaired or replaced at Seller's option. Seller's sole obligation and Buyer's exclusive remedy hereunder shall be such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect within 10 days after its discovery and, at Seller's option, return of such product to Seller, FOB Sentry's factory or provision of evidence (e.g., photographs) of such defect satisfactory to Seller.

Warranty Conditions & Limitations

This Warranty shall not apply to any Sentry product which, in the opinion of Sentry Equipment Corp, has been (a) altered or repaired in a manner affecting the efficiency or performance of the unit or (b) incorrectly installed or operated or (c) damaged in shipment or (d) damaged by flood or fire or (e) if the serial number is missing, altered or defaced.

Any materials required to be used by Seller as provided in customer specifications or instructions are excluded from the foregoing warranty and customer assumes sole responsibility for the selection of such materials. Customer further acknowledges and agrees that, to the extent Customer requests that Sentry make any recommendations with respect to materials to be used in connection with products, Seller may rely on published reference literature, that any references based on third-party studies may not correlate directly with the end user's intended usage or process (i.e., chemical composition, concentrations, temperatures, etc.), and that Customer is solely responsible for the final determination with respect to which materials are to be used in connection with the products.

EXCEPT FOR THE LIMITED WARRANTIES SET FORTH HEREIN, SELLER HEREBY DISCLAIMS ANY AND ALL WARRANTIES AND REPRESENTATIONS (EXPRESS OR IMPLIED, ORAL OR WRITTEN), INCLUDING ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE WHETHER OR NOT SELLER KNOWS, OR HAS REASON TO KNOW, HAS BEEN ADVISED, OR IS OTHERWISE IN FACT AWARE OF ANY SUCH PURPOSE, WHETHER ALLEGED TO ARISE BY LAW, BY REASON OF CUSTOM OR USAGE IN THE TRADE, OR BY COURSE OF DEALING OR PERFORMANCE. Without limiting the generality of the foregoing, Seller makes no warranty regarding ability of products sold hereunder to withstand erosion or corrosion, or regarding material compatibility of elastomers in specific services, and no warranty made hereunder shall apply to products which have been subjected to adverse storage.

The owner shall be responsible for maintenance of his equipment. Wear or damage caused by lack of normal maintenance or by misuse of the equipment shall not be considered as defective workmanship and material.

Sentry, and its subsidiaries, reserves the right to make product design changes or improvements without notice and without imposing any obligation upon itself to install these changes or improvements on its products previously manufactured.

This warranty is for the sole benefit of the original purchaser and is not transferable unless agreed to in writing by Sentry Equipment Corp.

Receiving Shipments (including loss or damage by transportation)

It is the customer's responsibility to check for missing cartons and sign of damage to cartons. If found, customer should note missing and/or damaged cartons on the delivery receipt and have delivery receipt signed by the representative of the transportation company. If unpacking discloses concealed damage from rough handling, the customer should request a concealed damage inspection from the transportation company.

The Sentry Customer Service Department will aid your organization in any claim proceeding for shortages or damages in shipment, but it is the receiver's responsibility to file claim with the carrier for damage or loss.

Liability Limitation

IN NO EVENT, WHETHER FOR BREACH OF WARRANTY OR OTHER CONTRACT BREACH, NEGLIGENCE OR OTHER TORT, OR ON ANY STRICT LIABILITY THEORY, SHALL SENTRY EQUIPMENT CORP., ITS SUBSIDIARIES OR ITS SUPPLIERS BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, LOSS OF INFORMATION, OR OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF, OR INABILITY TO USE, THE PRODUCTS, EVEN IF SENTRY EQUIPMENT CORP. OR ANY OF ITS SUBSIDIARIES, HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Customer Actions for Claims on Products during the Warranty Period

1. Contact the Customer Service Department, Sentry Equipment Corp, Oconomowoc, WI, Telephone: 262-567-7256, to obtain a Return Material Authorization (RMA) number.
2. You will be sent an "RMA" and a "Decontamination Statement" that is required to be filled out and returned with the equipment.
3. The following information must appear on the outside of the package:
   a. RMA number marked on outside of box.
   b. Decontamination Statement filled out and attached to outside of box.
4. Return defective equipment FREIGHT PREPAID. Collect shipments will be refused.
5. The factory will not process warranty claims until the customer has properly accomplished the above items.
6. The Sentry factory may accept the entire claim, a part of the claim or none of the claim if our inspection of returned parts proves the failure was for reasons other than defective material or factory workmanship.

➲ Important Notes:

1. *Sentry will not be responsible for damage incurred during the return shipment.*
2. *All returns subject to inspection and a minimum $100.00 evaluation fee for any products found not to be defective.*
3. *This RMA is not authorization for credit. Credits and/or replacements will be issued upon evaluation of returned goods.*
4. *RMA is valid for thirty (30) days from issue date.*

8. Factory Assistance

Sentry Equipment Corp engineers, manufactures and services equipment for sampling, monitoring, injection and analysis for worldwide customers in utility and process industries. Our equipment enables analytical and operational professionals to get safe, accurate and repeatable results. Recognized as a technology leader, Sentry Equipment Corp has been relied on by operational and analytical professionals for 90 years, and we pride ourselves in offering exceptional technical support.

Please do not return any equipment before discussing your application problem with a Sentry representative and obtaining a Return Authorization.

Sentry Equipment Corp has a complete staff of trained Service Department associates to assist customers with any problems. Please call Sentry at 262.567.7256 (Fax: 262.567.4523) to request a service representative.

Your Sentry representative is eager to help you. Please feel free to call your representative or contact Sentry Equipment Corp to discuss your application.

Sentry Equipment Corp
966 Blue Ribbon Circle N
Oconomowoc, WI 53066
Phone: 262.567.7256
Fax: 262.567.4523
E-mail: sales@sentry-equip.com

Appendix A: Modbus Map

Use Comm Port 2, configured as Modbus RTU, baud rate of 19200,8,N,1.

Registers:

40002 @GV.VERSION
40004 @GV.DRIPS_LEFT
40006 @GV.TIME_TILL_ADJUST
40008 @GV.TARGET_PERCENT_OPEN
40010 @GV.MAN_PERCENT
40012 @GV.DENSITY
40014 @GV.INJECTIONRATE
40016 @GV.MAX_GAS_FLOW
40018 @GV.NUM_BuMPS
40020 @GV.DEFAULT_GAS_FLOW
40022 @GV.FLOOR
40024 @GV.INJ_RATE_DB_ZONE
40026 @GV.NODRIP_BUMP_PCT
40028 @GV.METER_VALVE_MULT
40030 @GV.FW_VERSION
40032 @GV.SerialNum
40034 @GV.ACT_MOTOR_CUR
40036 @GV.DUMMY
40038 @GV.MBA_ALPHA
40040 @GV.MODEL_ALPHA
40042 @GV.DEFAULT_ALPHA_HI_DP
40044 @GV.DEFAULT_ALPHA_LO_DP
40046 @GV.DEFAULT_ALPHA_LO_LO
40048 @GV.ALPHA_MIN
40050 @GV.ALPHA_MAX
40052 @GV.MODEL_BETA
40054 @GV.PUMP_DROPS
40056 @GV.DROPS
40058 @GV.MAX_PUMP_DROPS
40060 @GV.TIME_ET
40062 @GV.TIME_LD
40064 @GV.TIME_SA
40066 @GV.DEFAULT_GAS_MSCFH

40068 @GV.MAX_GAS_MSCFH
40070 @GV.FLOOR_MSCFH
40072 @GV.PUMP_OFF_MSCFH
40074 @GV.MIN_CCM_MSCFH
40076 @GV.CALCULATED_GAS_FLOW
40078 @GV.GAS_FLOW_MSCFH
40080 @GV.GAS_SMOOTH_INTEGRAL
40082 @GV.ZONE1_STACK_MULT
40084 @GV.ZONE2_STACK_MULT
40086 @GV.ZONE3_STACK_MULT
40088 @GV.INJ_RATE_DB_OUT_PERCENT
40090 @GV.MODEL_LO_SW
40092 @GV.MODEL_MID_SW
40094 @GV.MODEL_MIDHI_SW
40096 @GV.MODEL_HI_SW
40098 @GV.DRIPS_REMAINING
40100 @GV.AGG_MOVE_PCT
40102 @GV.AGG_DRIP_COUNT
40104 @GV.AGG_STOP_DRIP_COUNT
40106 @GV.USAGE_PULSE_WIDTH
40108 @GV.METER_ALARM_DROP_COUNT
40110 @GV.PURGE_DELAY
40112 @GV.MIN_CCM
40114 @GV.PUMP_OFF_CCM
40116 @GV.PUMP_CYCLE_TIME
40118 @GV.NODRIP_STEP_TIME
40120 @GV.ACT_POS
40122 @GV.Dummy
40124 @GV.VALVE_TRAVEL_TIME
40126 @GV.PERCENT_OPEN
40128 @GV.LCC_INIT
40130 @GV.LPC_INIT
40132 @GV.PUMP_VOL_LEFT
40134 @GV.DRIPS_SINCE_SHUT
40136 @GV.PUMP_NUM_DROPS
40138 @GV.DUMMY
40140 @GV.DUMMY
40142 @GV.INJECT_LOLO

40144 @GV.INJECTLO
40146 @GV.INJECTHI
40148 @GV.INJECTHIHI
40150 @GV.STORELOLO
40152 @GV.STORELO
40154 @GV.STREAM_OPEN_PERCENT
40156 @GV.HOME_PERCENT
40158 @GV.BIG_MOVE_PERCENT
40160 @GV.USAGE_PULSE_RATE
40162 @GV.DUMMY
40164 @GV.INJECT_LOLO_DELAY
40166 @GV.INJ_LO_ALRM_DELAY
40168 @GV.INJ_HI_ALRM_DELAY
40170 @GV.INJ_HIHI_ALRM_DELAY
40172 @GV.MOTOR_ALRM_DELAY
40174 @GV.FAST_SPEED
40176 @GV.SLOW_SP
40178 @GV.LBS_PER_MMSCF
40180 @GV.LBS_USED
40182 @GV.DUMMY
40184 @GV.CONTRACTHOUR
40186 @GV.CUR_HOUR_TOT
40188 @GV.PREV_HOUR_TOT
40190 @GV.CUR_DAY_TOT
40192 @GV.PREV_DAY_TOT
40194 @GV.CUR_MONTH_TOT
40196 @GV.PREV_MONTH_TOT
40198 @GV.DUMMY
40200 @GV.GASFLOW_SOURCE
40202 @GV.C_PERIOD
40204 @GV.GASFLOW_VOL_FACTOR
40206 @GV.GASFLOWSTACK
40208 @GV.C_PULSES_LAST
40210 @GV.MAX_PULSE_ET
40212 @GV.GASFLOWPULSE_LD
40214 @GV.GASFLOWPULSE_ET
40216 @GV.C_PERIOD_ET
40218 @GV.Agg_Move_pctMin

40220 @GV.Pump_burp_time
40222 @GV.Home_Offset
40224 @GV.Tank_Volume
40226 @GV.Tank_Left
40228 @GV.Tank_Pct_Left
40230 @GV.Tank_Used
40232 @GV.BAT_2_READING
40234 @GV.LV_LALRM_STPT
40236 LV.LV_ALARM_DB
40238 @GV.Home_Cont_Current
40240 @GV.Home_Peak_Current
40242 @GV.Home_Timeout
40244 @GV.ENCRES
40246 @GV.SP
40248 @GV.SP_init
40250 @GV.Feedback_Time
40252 @GV.pct_pump_off
40254 @GV.BULK_LEVEL
40256 @GV.AutoClearNum
40258 @GV.ClearedAlarms
40260 @GV.auto_rst_dly
40262 @GV.ValveType
40264 @GV.Motor_Type
40266 @GV.Man_Gas_DLY
40268 @GV.ValveMin
40270 @GV.ValveMax
40272 @GV.Pump_pct_span
40274 @GV.Gas_SCADA_in
40276 @GV.Max_Time_Open

Coils

00001 @GV.Man_Auto
00002 @GV.bDummy
00003 @GV.Remote_stdby_Disable
00004 @GV.Local_Standby
00005 @GV.Shutdown
00006 @GV.Purge
00007 @GV.Pump_Mode
00008 @GV.iso_Shut_Ena
00009 @GV.MOTOR_POSITION_MODE
00010 @GV.NoFlow
00011 @GV._BAT_OK
00012 @GV._TS_inhib
00013 @GV._TS_REQ
00014 @GV.bDummy
00015 @GV.Usage_Count_Reset
00016 @GV.Ext_Alarm_Polarity
00017 @GV.bDummy
00018 @GV.InZone1
00019 @GV.Pump_Mode
00020 @GV.Pump_Mode_en
00021 @GV.pump_No_Odor
00022 @GV.dose_calc
00023 @GV.Meter_Valve_Alarm
00024 @GV.Max_Open
00025 @GV.No_Odorant_Alarm
00026 @GV.Max_Open_Alrm_Disable
00027 @GV.Ceiling_Alarm_Disable
00028 @GV.Floor_Alarm_Disable
00029 @GV.Gas_Flow_alrm_disable
00030 @GV.Inject_LoLo_Alarm
00031 @GV.Inj_Lo_alrm
00032 @GV.Inj_Hi_alrm
00033 @GV.Inj_HiHi_alrm
00034 @GV.Motor_Alarm
00035 @GV.Motor_Comm_Alarm
00036 @GV.Gas_Flow_Alarm

00037 @GV.Power_Loss_Alarm
00038 @GV.Stream
00039 @GV.Ceiling_Alarm
00040 @GV.Floor_Alarm
00041 @GV.Stuck_Valve_Alarm
00042 @GV.MTO_ALRM
00043 @GV.Remote_Standby
00044 @GV.Solenoid
00045 @GV.Alarm
00046 @GV.Enable_All_Alarms
00047 @GV.Disable_All_Alarms
00048 @GV.Disable_Ext_Alarms
00049 @GV.Motor_Alarm_Ack
00050 @GV.Find_Home
00051 @GV.Cold_Start
00052 @GV.Warm_Start
00053 @GV.Pump_Iso
00054 @GV.Alarm_Present
00055 @GV.LOCKOUT
00056 @GV.LV_Alarm
00057 @GV.Motor_Feedback_Alarm
00058 @GV.MOTOR_DRIVE_ENABLED
00059 @GV.Enable_Motor
00060 @GV.SSR
00061 @GV.Warm_Restart
00062 @GV.Motor_Config
00063 @GV.Comm_Alarm_Disable
00064 @GV.Stuck_Valve_Disable
00065 @GV.LV_ALARM_DISABLE
00066 @GV.Comm_Auto
00067 @GV.Feedback_Auto
00068 @GV.HiHi_Auto
00069 @GV.LoLo_Auto
00070 @GV.LV_Auto
00071 @GV.MeterValve_Auto
00072 @GV.Motor_Auto
00073 @GV.NoOdor_Auto
00074 @GV.Power_Auto

00075 @GV.Stuck_Auto
00076 @GV.Man_Gas_Alarm
00077 @GV.Man_Gas_Dis
00078 @GV.Reset_Offset
00079 @GV.Mot_Typ_Alarm
00080 @GV.ServoAttached
00081 @GV.ValveFullOpen
00082 @GV.ArmServoCal
00083 @GV.ExServoCal
00084 @GV.STartCalAlarm